AN ARGUS SPECIALIST PUBLICATION

FEBRUARY/
MARCH 1986

ZX COMPUTING

£1.95

The Magazine For All Sinclair Users



SPECIAL
BUSINESS
FEATURES:

PRINTERS AND
INTERFACES

TASWORD
WORDCOUNT

TABCALC-A
SPECTRUM
SPREADSHEET

GAMES:

GOBLIN
DUNGEON

SPIDERS!

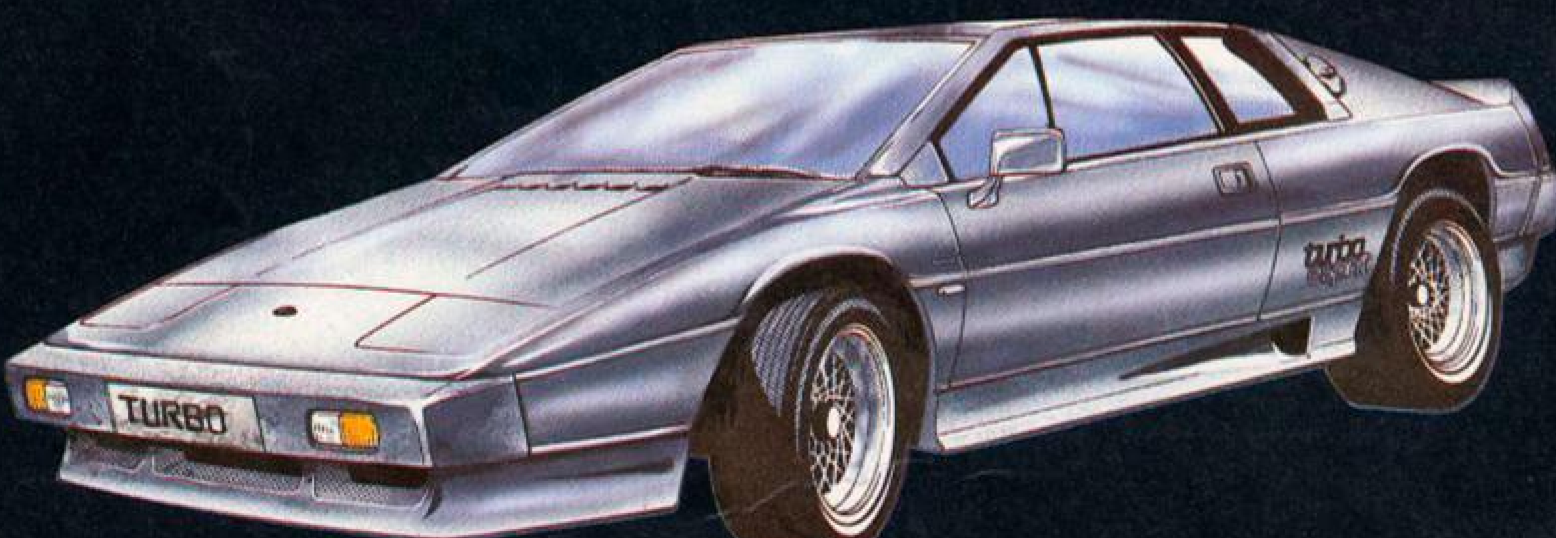
ALIEN!

With More Editorial Pages Than Any Monthly Magazine

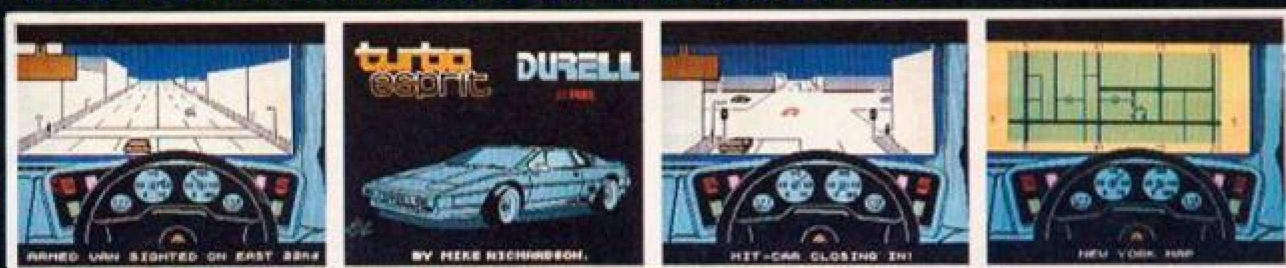
turbo esprit

DURELL

software getting harder



With Technical Assistance from Lotus Cars Ltd.



Spectrum and Amstrad

R.R.P. £8.95

DURELL COMPETITION
Entry Coupon
Cut out this coupon and send it with a completed entry form included with any of the new Durell games.

DURELL sales dept.
Castle Lodge, Castle Green, Taunton TA1 4AB

VISA
ACCESS

SPEEDYSOFT

01-846 9353 (24 HRS)

EUROCARD
MASTERCARD

WE ALWAYS TRY TO SEND YOUR PROGRAMS ON THE SAME DAY WE GET YOUR ORDER, THAT'S WHY IT'S CALLED SPEEDYSOFT! All programs normally in stock before we advertise them! FOREIGN ORDERS WELCOME, satisfied customers in 64 countries for 3 years. UK prices include VAT: export prices are the same, plus p&p, because of the extra work involved. Pay by sterling cheque, bank draft or postal order. All orders must be prepaid: we send your programs as soon as we get your money! It's faster to order by phone from any country with your VISA, EUROCARD, MASTERCARD or ACCESS. Call 01-846 9353, 24hrs, 7 days a week. ALL PROGRAMS FOR SPECTRUM AND SPECTRUM +. BIG FREE ILLUSTRATED CATALOGUE WITH EVERY ORDER: DETAILED REVIEWS, LOAD TIMES, WHAT THE CRITICS SAID, ETC.. Catalogue includes all the classic 'serious software', too. Send £1.00 (refunded with your first order) for catalogue only. TWO FREE BLANK TAPES OR ONE FREE MICRODRIVE CARTRIDGE IF YOUR ORDER FROM THIS AD COMES TO £30 OR MORE, excluding p&p. State choice on order form.

"... A SERVICE THAT IS AS RELIABLE AS YOUR PROGRAMS"
(J. Noppen, Belgium)

WHAM!

"Wham!-The Music Box is as serious a piece of software as Tasword or The Quill and it's responsible for the music on Fairlight and the Exploding Fist." (Sinclair User) A totally new music creating program for your Spectrum. For the first time, real two-channel music and percussion effects. Includes demo of 5 Wham! hits: Freedom, Tropicana, Careless Whisper, Young Guns Go For It and Bad Boys. Easy to use. No Stick. (Melbourne House) **Cassette £9.95**

NATO ALERT

A wargame simulating a non-nuclear conflict in Europe between NATO and Warsaw Pact forces. 1 or 2 players, 5 skill levels. Up to 21 different objectives may be chosen, to determine length of play. Complex, horrifyingly realistic. Map graphics help. Hints given, too. No Stick. One of our most popular programs. (CCS) **Cassette £5.95**

LORD OF THE RINGS

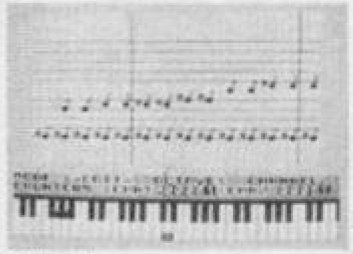
The program everyone's been waiting for, from the Hobbit team. 800 word vocabulary in this beautiful graphic adventure. Over 200 locations. Twin cassette pack plus copy of the 530-page book 'Fellowship of the Ring'. **Cassettes/Book £15.95/ 'The Hobbit' itself still available for only £12.95 (save £2.)**

TOMAHAWK

"A superb simulation, with plenty of action." (Sinclair User) "While conventional aircraft simulations are ten a penny on the Spectrum, this is distinctly different and it boasts the added advantage of armed combat ... controlling the machine is surprisingly simple." (Popular Computing Weekly) "All helicopter characteristics are faithfully reproduced ... much more accessible to the casual player than Fighter Pilot." (Your Computer) Sticks OK. (Digital Integration) **Cassette £9.95**

THE ART STUDIO

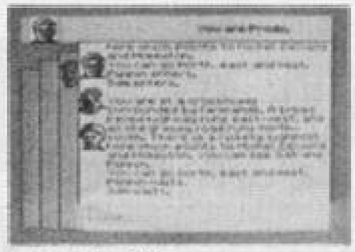
"This program really makes the Z80 chip sing ... performed just like MacPaint on the Macintosh." (Personal Computer World.) "Outperforms 'The Artist' in almost every way. It has superior speed and the menus are easier to use ... contains a printer driver which handles most Spectrum compatible printers. It is an extremely powerful utility which should be of use to professional artists and designers as well as the home user." (Sinclair User.) AMX Mouse compatible,too. Fantastic new drawing package. (Rainbird) **Cassette £14.95**



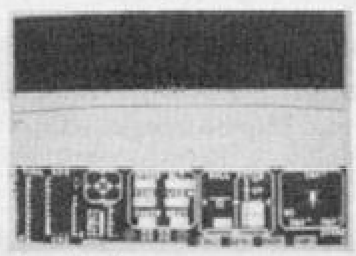
Wham!



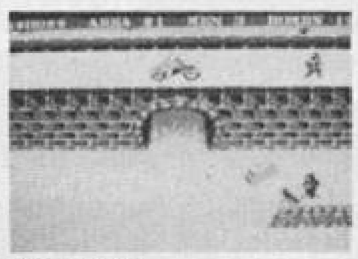
Nato Alert



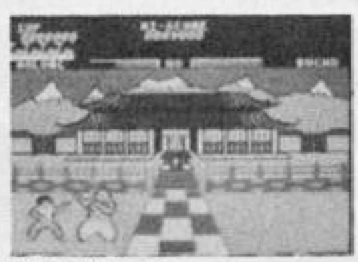
Lord of the Rings



Tomahawk



Commando



Yie Ar Kung Fu

COMMANDO

Thrilling chart-topper based on the arcade hit. Your are Super Joe, crack combat soldier. You must defeat the rebel forces with your machine gun and six hand grenades, until you collect more from the outposts you defeat. Great graphics and sound. Sticks OK. (Elite)**Cassette £7.95**

QUILL/ILLUSTRATOR

"Simply brilliant .. put a lot of work into The Quill and you can write a game as quick and slick as any on the market." (BigK) Write and sell your own machine-code graphic adventures with these two amazing utility programs from Gilsoft. The Illustrator allows full-screen hi-res pictures to be added easily to the adventures you've written with The Quill. The two programs, now only £22.95 together. Add The Patch for £6.00 for split-screen text/graphics and some interesting sound effects, too!

GAMES PLAYER

Slow down and live longer with this combined joystick interface and game speed controller. It runs any software which works with a Kempston stick. Microdrive compatible, *too. Make any game run* as slow as you like, or freeze the screen to photograph the high-score table! Simply plugs onto the back of your Spectrum. (Dk'Tronics) **Games Player Interface £12.95**

YIE AR KUNG FU

Probably the best of all the kung fu games. Double-sided tape. To become a grandmaster, you must load and defeat 8 opponents, each more deadly than the last. 10 different attack moves to learn. Great graphics. Sticks OK. (Imagine/Konami) **Cassette £7.95**

MONOPOLY

"An excellent simulation ... vastly superior to the other, non-authorised versions ... the graphics are very realistic." (Home Computing Weekly) Official Monopoly, with 3D board view; for 2 to 6 players any or all of whom may be the computer. Specify length of game if you wish. No Stick. (Leisure Genius) **Cassette £9.95**

NOW GAMES 2

Another great compilation tape. **AIR WOLF (Elite) CHUCKIE EGG 2 (A&F) TIR NA NOG (Gargoyle) CAULDRON (Palace) WORLD CUP (Artic). Cassette £8.95.** NOW 1 still available with Lords of Midnight/Brian Bloodaxe/Strangeloop/Pyjamarama/Arabian Nights/ Falcon Patrol2. Cassete £8.95. Or buy both tapes for just **£16.95**

"EXCELLENT CATALOGUE AND EXTREMELY FAST SERVICE
(A. Ammundsen, New Zealand)

MICRODRIVER Mk2

PERFECT TAPE/MICRODRIVE TRANSFER AT THE PRESS OF A SINGLE BUTTON! *"Menu-driven, very easy to use and well error-trapped ... I much preferred the Microdriver." (Your Spectrum)* Dumps the whole of memory to microdrive. Save and reload any program. No use to pirates as Microdriver must be present to RUN Saved programs. Specially designed ROM fits onto the back of your Interface 1 or 2. Through connector for add-ons.£39.95.
Microdrive cartridges available in packs of 4 for only £8.00. Or 20 cartridges in a stylish black plastic filing box only £35.95. The Mirage Microdriver: £39.95

WINTER SPORTS

Great new joystick waggler with eight very different and very well planned sporting simulations loading separately. Downhill. Slalom. Giant Slalom. Ice Hockey. Ski Jumping. Speed skating. Bobsled. Biathlon. Very good value. Sticks OK. (Electric Dreams) **Cassette £7.95**

POST TO: SPEEDYSOFT (ZX16)
37 CHURCH ROAD, LONDON SW13 9HQ, ENGLAND.
For CATALOGUE ONLY, send £1 cash. Refunded with your first order.
My computer is .... I enclose a cheque/PO payable to SpeedySoft OR charge my VISA/ACCESS/EUROCARD/MASTERCARD

No. ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Signature: ____________ Expiry Date ____________
Please write clearly. If we can't read it, you won't get it.
Name: ____________
Address: ____________
____________ Postcode: ____________
PHONE NO: if any, in case of query ____________

Program Name	Price
Postage & Packing UK add 75p per order	
Europe ADD £1.00 per program	
Outside Europe ADD £1.50 per program	
Total Order	

ZX COM

Editor: Ray Elder
Assistant Editor: Cliff Joseph
Group Editor: Dave Bradshaw
Group Managing Editor: Wendy J Palmer
Advertisement Manager: Barry Bingham
Advertisement Copy Controller: Lynn Collis
Production Controller: Sue Couchman
Software Assistant: John Gerard Donovan
Managing Director: Peter Welham

Origination and design by Argus Design Ltd., Circus House, 26 Little Portland Street, London W1N 5AF.

Published by Argus Specialist Publications Ltd, 1 Golden Square, London W1R 3AB.

CONTENTS



Please note that Sinclair, ZX, ZX80, ZX81, ZX Spectrum, QL, ZX Microdrive, ZX Interface, ZX Net, Microdrive, Microdrive Cartridge, ZX Printer, and ZX Power Supply are all registered trademarks of Sinclair Research Ltd.

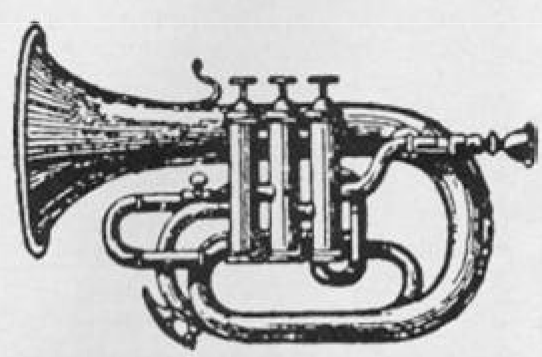
Subscription rates: UK £13.50 including postage. Airmail and other rates upon application to ZX Computing, Subscriptions, Infonet Ltd, Times House, 179 The Marlowes, Hemel Hempstead, Herts HP1 1BB (Tel: 0442 48432)

ZX Computing is constantly on the look-out for well-written articles and programs. If you think that your efforts meet our standards, please feel free to submit your work to us for consideration for publication.

All submitted material should be typed if possible; handwritten work will be considered, but please use your neatest handwriting. Any programs submitted should be listed, a cassette of your program alone will not be considered. All programs must come complete with a full explanation of the operation and, where relevant, the structure; Spectrum programs should be accompanied with a cassette of the program as well as the listing.

All submissions will be acknowledged and the copyright in such works which will pass to Argus Specialist Publications Ltd will be paid for at competitive rates. All work for consideration should be sent to the Editor at our Golden Square address.





MPUTING

ZX Computing is published bi-monthly on the fourth Friday of the month. Distributed by: Argus Press Sales & Distribution Ltd, 12-18 Paul Street, London EC2A 4JS. 01-247 8233. Printed in the UK by: Garnett Print, Rotherham and London.

The contents of this publication including all articles, designs, plans, drawings and programs and all copyright and other intellectual property rights therein belong to Argus Specialist Publications Ltd. All rights conferred by the Law of Copyright and other intellectual property rights and by virtue of international copyright conventions are specifically reserved to Argus Specialist Publications Ltd. Any reproduction requires the prior written consent of Argus Specialist Publications Ltd.
© Argus Specialist Publications Ltd 1986







This issue marks the end of the second year of my occupation of the Editor's chair, and ironically the last time my posterior will warm that illustrious plastic.

Yes folks, the time has come for me to move on.

In the time I have spent producing ZXC there have been many changes, the Spectrum established its dominance and the QL emerged — although only lately has it begun to sell in large quantities, and now the 128K Spectrum.

Through all this we have maintained our policy of providing something for everyone and in return our readers have been some of the most loyal around. But times change, and in computer circles faster than any other, and we must keep up with them. So ZXC has undergone much discussion and there are many new and exciting developments in store.

For a start, and many of you have indicated that you would be in favour of such a move, we will become a monthly publication. Twice the amount of info, games, programs, reviews and articles a year as in the past.

As for myself, I am pleased to hand over to Bryan Ralph who has done excellent work on other Argus publications and whom I know will bring a new freshness and drive to ZXC. But before you get out the hankies (or cheer wildly as the case may be) I will still be around and writing for the mag — look for those tell tale tongue in cheek remarks, cynical comments and verbal flatulence.

Onwards and upwards!

A leaving present

It's not often we use a program in this section, but I was talking to a TV producer the other day and I mentioned my involvement with computers:

'Oh yes,' he said. 'All our programs are computerised now.'

'What meanest thou?' asked yours truly.

'Just what I said, all our programs are computerised.'

'But how?' I queried. 'Do you mean, scheduling, script copying, electronically controlled or what?'

'Oh nothing as complicated as that,' he haughtily threw back. 'Only the important bits, the storylines'.

Of course I felt a gentle tugging of the lower limb and was about to remove myself from his presence when he offered to show me a copy of such a storyline writing program, written for the BBC computer (what else!).

True to his word he appeared a few days later clutching a wad of two sheets of printout paper and, eliciting a promise of secrecy, let me have a look. So before you read the Spectrum conversion I made and have printed around here somewhere, take your Spectrum manual in your right hand and repeat these words:

'I promise not to tell another soul about this program'. Now cross your heart and hope to die.

```
   1 REM storyline program
for FULL GIRLS FAMILIES HOUSE,
 a comedy show.
(not for public perusal)
  10 DIM L$(31,32)
  20 FOR K=1 TO 30: READ L$(K):
NEXT K
  30 FOR K=0 TO 14
  40 LET X=INT (RND*30)+1
  50 IF L$(X)<>" " THEN GO TO 40
  60 LET L$(31,X)="X"
  70 PRINT AT K,0;L$(X)
  75 IF RND>.7 THEN PRINT "and"
  80 NEXT K
  90 INPUT "PRESS ENTER FOR THE
NEXT PAGE";A$
 100 RUN
9000 DATA "Boy meets girl","Girl
meets dog","Landlord with funny
voice enters","Strange girl with
spots appears","Man falls down s
tairs","Boy sticks glue on seat"
,"Girl loses skirt","Man with no
trousers calls","Dog pukes on ma
ns shoes","Boy takes girl home",
"Girl takes boy home"
9010 DATA "Girl takes off skirt"
,"Man kicks dog","Boy eats laxat
ive chocolate","Joke about knick
ers","Girl slaps boy","Man slaps
 boy","Boy bites dog","Dog runs
away","Joke about picking nose"
9020 DATA "Man scratches bum","G
irl swears at dog","Boy pretends
to be a girl","Girl pretends to
be a boy","Man pretends to be a
man","Joke about knickers","Girl
makes silly face","Man sticks ou
t tongue","Boy writes diary","Do
g inherits fortune"
9999 REM often this wont make
sense, but use it anyway, noone
has ever noticed before.
```

Meanwhile . . .

We decided to feature the serious side of computing in this issue, some of the applications which help us in our daily struggle to make life easier in work or play.

Programs, reviews and articles abound on this theme, but never fear, we haven't forsaken all else. Games, programs and reviews, get their share of the space, regular features, articles and hardware, news and gossip all have their place and can be found within these pages.

The Great Debate . . .

Dear Sirs,

Your Mrs. Brooksbank who writes in defence of hex seems to misunderstand. I am not roundly condemning hexadecimal, I just meant that the average person who understands and programs in Z80 machine code (not to be confused with assembler) can read a decimal listing almost as easily as he reads this printed page. If there are addresses to figure, that's what the computer is for. I find programming in machine code far from being difficult or forbidding. Once you understand computer logic it all becomes quite elementary. I have no problem dealing with binary in those programs that require bit manipulation, such as graphic programs and those that translate characters held in a

horizontal eight bit file to a vertical seven bit output for a printer. But, when I need to find out how a machine code routine works, maybe in order to modify it, having to translate each byte from hex to decimal (I think in decimal, I program in decimal, and when I use a Sinclair computer I enter my code in decimal) I find it impossible to follow the program past the first five bytes.

I have found hex to have its uses, such as in music programs where you need two full octaves of one byte notes, and other places where nine is not enough. However, in all honesty, I cannot see where it does much to simplify Sinclair listings, or enhance their readability. Besides, hex loaders use much more memory than a simple decimal loader. I have always tended toward 'lean, mean code'. Now of course, here we are talking hacking. The time and care invested in a hacker's routine would never be tolerated in a business environment employing so called professional programmers, though in my experience I have found if you take away the assembler and book of algorithms from these 'professionals' the majority would not even be able to write their own names.

Well, I have rambled on long enough, but I am still looking for a good reason for hex in Sinclair listings.
Sincerely yours,
Ulysses B. Adams
Philadelphia, USA

Kempston E

Dear Mr. Elder,
Following the publication of my letter in the current issue of ZX Computing, I thought that your readers might be interested in the sequel to my problems with the Kempston E printer interface.

Shortly after writing the letter, I found that the interface was not compatible with microdrive. Mr. Archer of Kempston was extremely helpful and agreed to change the interface free of charge. He also customised the Eprom code to enable the screen dump faciltities to match my Star DP515 printer. What a difference! (I can even customise the characters as the heading on this letter indicates).

Whilst I'm in the mood for singing praises, I would like to mention that I purchased a Rotronics Wafadrive at the beginning of the year, which is a lovely little machine once you learn to handle it. I overcame its one deficiency (no screen dump) by plugging the Kempston interface into the back of the wafadrive. It works beautifully provided that the printer is not switched on and off while a program is running. I also occasionally connect my daughter's Silver Reed EB 50 typewriter to the Wafadrive's centronics port. It's quite fascinating to watch it drawing merrily away, and changing colour, from a Basic program.

Using the Kempston Interface in this way means that you can't use Softek's Spectral Writer. I contacted them to see if it could be modified, but they were not interested — almost to the point of rudeness. By contrast I contacted Martin Idle of Tasman who couldn't have been more helpful. He promised to send me instructions to modify Tasword 2. These duly arrived two weeks later, took about 20 minutes to implement, and the program's been working perfectly ever since. I certainly know which Software house to support in the future!
J.F. Tydeman
Baldock
Herts

Sorry about that . . .

Dear Ray,
It is ironic that the contents page of the October/November issue of ZX Computing, you should have credited me with the authorship of John Ure's item on peripheral problems, for I had tried to 'phone him as soon as I read his earlier article. However, each of the three Ure's in the Birmingham directory denied all knowledge of him! It is ironic, for I was going to pass on similar information to that in the current issue. I too had had similar problems to those he described; after a while, Tasword crashed, usually with about an hour's work wasted. The crashed rapidly became of increasing occurence, and were exacerbated when a Discovery Disc unit was attached, in spite of its beefed-up power supply. A local shop sent it for repair; three weeks later it was returned. No repair has been done; they said it was 'working to specification'. I then discussed the problem with Mancomp, a firm which frequently advertises, and subsequently sent it there. I simultaneously asked for a spare Z80 chip for a spare Spectrum. I wish I hadn't bothered to ask for this. The total bill was extremely reasonable for the work done and each of the several replaced chips had been removed from the printed circuit board incredibly neatly with a solder sucker, and replaved with a chip in the proper chip-holder, so that defective chips can be immediately replaced if anything goes wrong again. I could not hope to approach his standard of work, and will probably take my spare Spectrum to them for professional repair with the chip the sent me!

Incidentally, the repair took only three days, a matter of great relief to me, since I had about half-a-dozen unfinished articles of one sort or another locked up in Tasword files.

I can recommend this firm unreservedly for their efficiency in finding the fault (yes, it was, among other things, the ULA again!), their workmanship and their service.
Yours sincerely,
D.A. John Wase

Full screen$

Dear Sir,
I noted with interest the letter in your August/September edition explaining how to copy a full 24 line screen from the Spectrum to the printer. The letter however appeared to be incomplete.

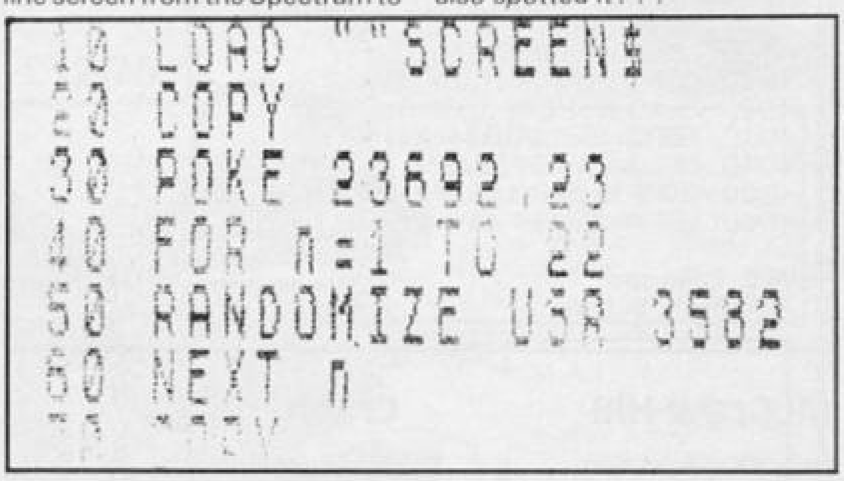
It is possible to copy a full 24 line Spectrum screen to the ZX printer without resorting to machine code — just one ROM routine will do the trick. The routine below will COPY the first 22 lines normally, then scroll those 22 lines off the top of the screen, leaving only lines 23 and 24, now moved up to the top of the screen. The next COPY command then starts to copy the whole screen, at which stage you can use BREAK, after the two lines at the top have been copied.

As well as a listing, I have included two screen copies to illustrate that the routine does work.

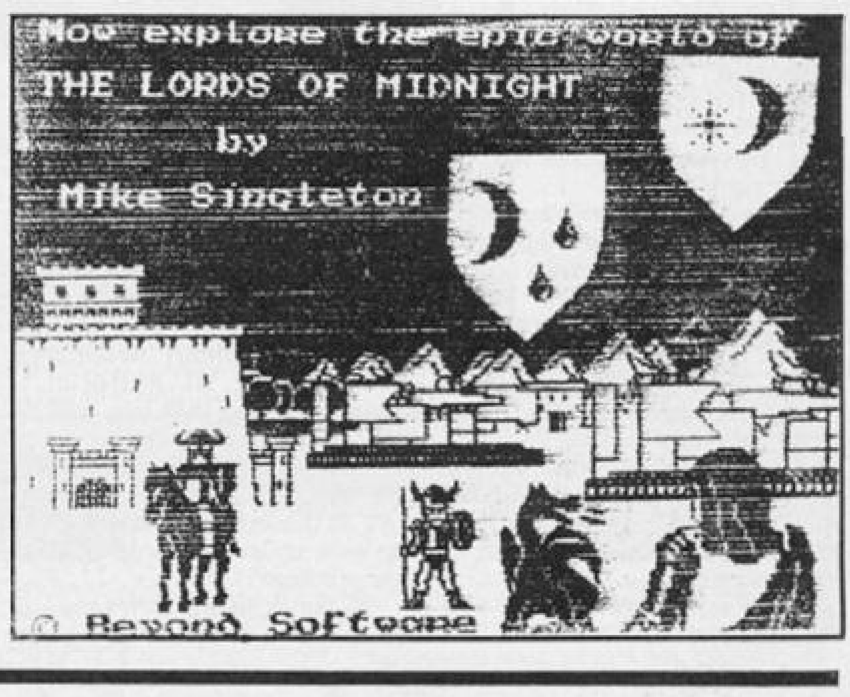
```
10 LOAD "" SCREEN$
20 COPY
30 POKE 23692,23
40 FOR n = 1 TO 22
50 RANDOMIZE USR 3582
60 NEXT n
70 COPY
```

Yours faithfully,
R. Thornber
Lancashire

Er — yes, funny you should mention that, the original author also spotted it. . .



```
10 LOAD "" SCREEN$
20 COPY
30 POKE 23692,23
40 FOR n=1 TO 22
50 RANDOMIZE USR 3582
60 NEXT n
```



Sorry!

Dear Ed,
You have missed it!

Yes, you have printed my letter on '24 line screen copy routine', however, you have forgotten to print the routine itself. English magazines don't come to Turkey very regularly, so I could not write this correction letter before.

Now, I'm re-writing the routine, probably with a slight difference to the one I sent before.

I hope that this letter is not late or that you have realised the mistake.

Yours sincerely,
Turgut Aydin

```
10 DATA 243,6,192,33,00,64,205,178,14,201
20 CLEAR 29999: RESTORE FOR n=30000 TO 30009:
   READ a: POKE n,a: NEXT n
30 PRINT "Start tape to load a screen picture."
40 LOAD "" SCREEN$
50 RANDOMIZE USR 30000: GO TO 50
```

Spectrum Disassembler

Dear ZX Computing,
S.H. Man's useful program (Oct/Nov 1985 pp 96-99) needs two improvements.

The first is to allow for the Definition Byte that always follows RST 0008 in a Spectrum machine code program. The simplest way is to alter the 'RST 0008' of line 2210 to 'RST 008,#'.

The second is to work out and print the absolute address for relative jumps, for no one wants to have to bother with Hex arithmetic to find out where relative jumps go to. This can be done by adding the following lines:

```
145   IF C$  "39" THEN IF C$(2)="0" OR C$(2)="8"
      THEN IF C$  "OF" THEN GO TO 4000
3950  DATA "DJNZ","JR","JR NZ,","JR Z,","JR
      NC,","JR C,"
4000  RESTORE 3950
4010  FOR J=0 TO INT (BYTE/8)-2
4020  READ I$: NEXT J: GO SUB 980
4030  LET Q=A: LET Q$=A$
4040  LET A=A+BYTE-(256 AND BYTE 127)
4050  GO SUB 950: LET I$=I$+A$
4060  LET A=Q: LET A$=Q$: GO TO 350
```

W.E. Thomson
Aldeburgh, Suffolk

McGraw-Hill

Dear ZX Computing,
Thank you for publishing my plea, with Randle Hurley's 'Spectext' wordprocessor program from 'The Spectrum Workshop — Word-processing and Beyond', published by McGraw-Hill.

In fairness to McGraw-Hill, I must relate what has happened since I last wrote to you. In response to a second letter, McGraw-Hill sent me a free tape of the program. This too, was faulty, but they replaced it and I have been using it without difficult for two months.

It may have taken several months to get it right, but full marks to McGraw-Hill for their generous after-sales service!

Yours sincerely,
Julian Blackmore
Norfolk

Crash?

Dear Editor,
First to express my sincere appreciation of your excellent publication. Especially in these hard times of home computing, with so many manufacturers going through financial difficulties I cannot help but notice the drastic reduction of advertisements in ZX Computing and other UK publications. You must certainly be commended for keeping up with an excellent magazine without decreasing the amount of editorial. I sincerely hope that you will be able to continue to do so.

Referring to the amusing article 'What Does It Do?' by John Ure, in the Aug/Sept issue, I may be able to throw some light on his problem.

Is his problem a 'freeze up' when using *Tasword* on his set-up? When this happens nothing can be done except start from scratch. Then it is not the *Tasword* program but the Fuller keyboard.

This was my problem and I reverted back to a DK Tronics keyaboard I have (minus space bar from the archives) and no more freezes have been experienced by me since.

Having read the article made me realise that it was the keyboard and I will be writing to Nordic Keyboards who, I believe, are the distributors of the Fuller keyboards to see if they can help us out. I am really missing my Fuller keyboard and to my mind it is the best keyboard available for the Spectrum with its single key entries for fullstop, comma, cursors and delete, extra shift keys for the mode keys certainly is a pleasure to use. That is, if it works.

Yours sincerely,
Fred Bruggink
S. Africa

Cribbage

Dear Sir,
Your two-part programme 'IQ Test' was superb and works like a gem: my compliments to Greg Turnbull.

I have two criticisms and corrections which I'd like to share with other readers who may have typed it in:

1) Once someone is busy doing the test, it's terribly simple to forget which question number you had just attempted, thus quite easy to skip one or two. By adding one simple line the current question being attempted is displayed on line.

```
145 PRINT AT 0,28;"  "; AT
0,28;"Q.";B
```

2) The other snag is that the real-time clock will only stop the game if MIN=30. That is to say, if someone has taken 31 minutes it just keeps on going! The way out of this is to amend line 1055.

```
1055 IF MIN =30 THEN
GOTO 1950.
```

ZX Computing is still the best magazine of its kind one can buy — keep up the wonderful work. And by the time this letter is printed it will be time to wish Ed, staff and readers a Happy Christmas and a Happy New Year.

Sincerely,
Laurence Creighton
S. Africa

Deletions

Dear editor.
Norman Green's article in ZXC 2/7 about deleting programmes was a useful one, also to us ZX81 owners. We can use the same machine code programme, only that we call some other addresses in the ROM: 'Call 6510' should be replaced by 'Call 2520', and 'Call 6629' by 'Call 2653'. These are the routines that Ian Loan calls LINE=ADDR" (09D8 hex) and RECLAIMING (OA5D hex).

Even some sort of merging is possible on our ZX81: If you use a memoblock that allows for data to be stored in the 8-16K area, then you can store your favourite programmes there before you load the programme you are going to work with. You will need to think out a method to fetch exactly the programme you want from the store, and then you will be able to enter it into the programme file by using some combination of the LINE=ADDR subroutine and another one, which Ian Logan calls MAKE-ROOM (2462 dec=099E hex). This method also enables you to squeeze more data into your RAM, since the programme file only needs to contain one or two programmes at a time. — It makes less than a second to have a programme 'merged' in that way.

Finaly, here is a simple decimal loader that makes it easy to deal with numbers bigger than 255. First you enter the address where the mc is to start, and then the decimal codes. You will have to use STOP to get out of the program again.

```
800  INPUT K
805  PRINT K;" ";
810  INPUT N
815  IF N  255 THEN GOTO
     850
820  POKE K,N
825  PRINT N
830  LET K=K+1
835  GOTO 805
850  POKE K,N-INT
     (N/256) *256
855  PRINT N-INT
     (N/256) *256
860  LET K=K+1
865  PRINT K;" ";
870  LET N=INT (N/256)
875  GOTO 820
```

Yours,
Johannes Lind
Denmark.

PERIPHERAL POWER





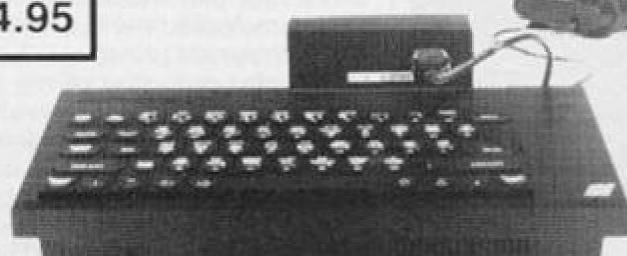
CASSETTE/DATA RECORDER 500
For your home computer, will allow easy loading of even the most stubborn program. Features include save indicator, mains/battery, accepts standard computer leads and 5 pin DIN connector. Also provides exceptional audio quality for fine listening (Batteries not included) £24.95

CHEETAH "SWEET TALKER"
Based on an allophone system, program any word or phrase, providing unlimited speech. Now make your Spectrum talk. Compatible with Interface I & II and Spectrum + ... £24.95



MEGASOUND
For 48K Spectrum and ZX Spectrum +. Achieve amazing sound capabilities that your Spectrum has been lacking. Just plugs into the user port at the rear of your computer and amplifies sound through your T.V. £10.95

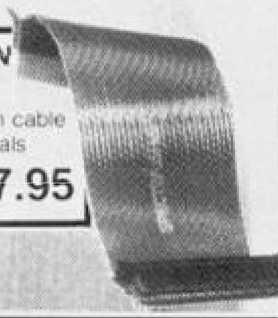




SPECTRUM JOYSTICK INTERFACE
Simply plugs into the user port at the rear of the computer and accepts any Atari style joystick including Cheetah 125, Quickshot and Kempston. Comes without rear edge connector at £9.75

or with connector which allows other peripherals to be stacked up at £12.75

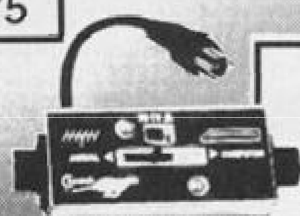
56 WAY EXTENSION CONNECTOR
Cheetah's 6" long extension cable enables Spectrum peripherals to be distanced from your computer ... £7.95



125 JOYSTICK
Compatible with ZX Spectrum. Four extremely sensitive fire buttons. A built in auto-fire switch provides continuous shooting at the touch of a fire button £8.95



AERIAL SPLITTER
Cheetah's neat splitter unit complete with self adhesive pad allows you to keep your T.V. and computer aerial leads plugged in without disturbing the picture £2.25

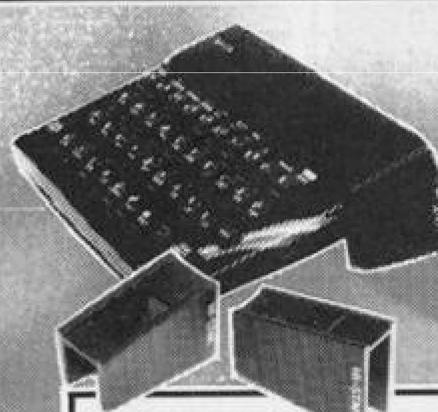


SPECDRUM
8 digitally recorded real drum sounds. Extra sounds can be loaded from tape, creative, educational and fun. The most exciting peripheral ever developed! £29.95

Latin Kit & KitEditor £3.99



HI-STAK FEET
These instantly applied stick on feet for your ZX 81, Spectrum, New Brain, VIC, TRS etc. tilt the computer and make your keys easier to see and more enjoyable to use, allowing smoother programming. £2.99



R.A.T.
The Cheetah Remote Action Transmitter is the most sophisticated computer controller available! Infra red transmission - so there are no leads trailing across the living room. Touch control, extremely fast, can be used with Cheetah RAT/Kempston compatible software. Complete with receiver/interface. £19.95

All Cheetah peripherals are manufactured to the highest possible quality standards and carry a full 12 month warranty

Prices include VAT, postage & packing.
Delivery normally 14 days.
Export orders at no extra cost.
Dealer enquiries welcome.

Cheetah, products available from branches of John Menzies, Boots, WHSMITH, WOOLWORTH, Spectrum dealers and all good computer stores.

Cheetah Marketing

CHEETAH MARKETING LTD.
1 WILLOWBROOK SCIENCE PARK,
CRICKHOWELL ROAD, ST. MELLONS, CARDIFF
TEL: CARDIFF (0222) 777337 TELEX: 497455

Shoptalk Shoptalk

Odds and ends, letters, and company info





A New Insight?

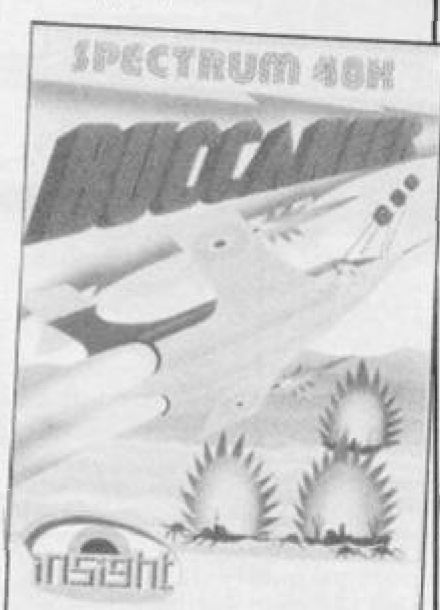
Insight are a new company to us and they have sent three of their programs along for review. VECTRON, BUCCANER and STAR FIREBIRDS are the titles and all are arcade games priced at £7.95

Star Firebirds is an arcade clone where you dodge L/R, firing at swarms of swirling alien birds, which destroy on contact and also drop bombs. Megabombs sometimes appear to add to your problems. There are many levels and features and play gets fast and furious.

Buccaneer is not a pirate game but a sideways scrolling aeroplane game which introduces aliens to an earthly landscape. Again control is simple, up/down and fire. Some good touches such as docking to replenish fuel and shields, and the action is fast and furious.

Vectron is a most impressive 3D perspective maze game with similarities to the film Tron. There is an option to overlay the map which gives information on enemy positions and power sources but while this is showing you cannot fire your weapons.

However, the games can only really be described as average to play, Buccaneer and Firebirds due to the limited action — dodge and fire, and Vectron due to the difficulty of play. It is so fast it is almost impossible. This makes the asking price far too high, around £5.00 would still be expensive and probably a lower budget price would be most appropriate.



Back To School

ST BRIDES School software had me bemused at first and I am still not sure how to take their press releases. They are so convincing that I am starting to be drawn in- to their fantasy world. One day I'll persuade my boss to finance a trip so I can see for myself.

Meanwhile, their second program, THE SNOW QUEEN, has impressed us in the brief time we were able to run it on our Spectrum. In two parts plus a novelette version of the story, it is a text adventure with graphics and features the compulsive humour and wicked problems which were evident in their first game.

Actually, mentioning Snow Queen was just an excuse to print a part of their press release showing the author, Priscilla Langridge in some of her many guises.



PRISCILLA AS WONDERGIRL™ (OF WHOM YOU WILL BE HEARING MUCH)

BYTTEN by the BUG

Bug Byte was a well known and respected software house who were taken into the Argus fold. Their re-emergence will be welcomed by many.

Their first new offerings are three arcade games, BOMBER BOB, ZOOT and DOGSBODY and a four part massive adventure game called the LUDOIDS.

All these are priced at £2.95 and, whilst not state of the art programs, represent good value for money. Zoot in particular is a platform game with a difference, you don't jump, but move, complete with platform section, down, left or right. Depending on which screen you are on, your task is to punch, trap, collect, clear or dodge. On more advanced levels combinations of these actions are required. It is a game which requires thought and reflexes and is well presented with good animation.

Bomber Bob has you defusing bombs in the White House by bouncing around the maze like screens. Nasties get in your way and cause your demise and again fast action and good graphics are used. Ludoids is a mind bender of an adventure game which you need to complete in sequence before moving on to the next stage, use of an elusive password ensures this.

Welcome back Bug Byte.

Chat

News and comments from the software scene.

● Martech have released a computer program based on the highly successful Channel Four T.V. Series, THE LIVING BODY.

'The Living Body' will cost £14.95 fron high street stores and computer shops.

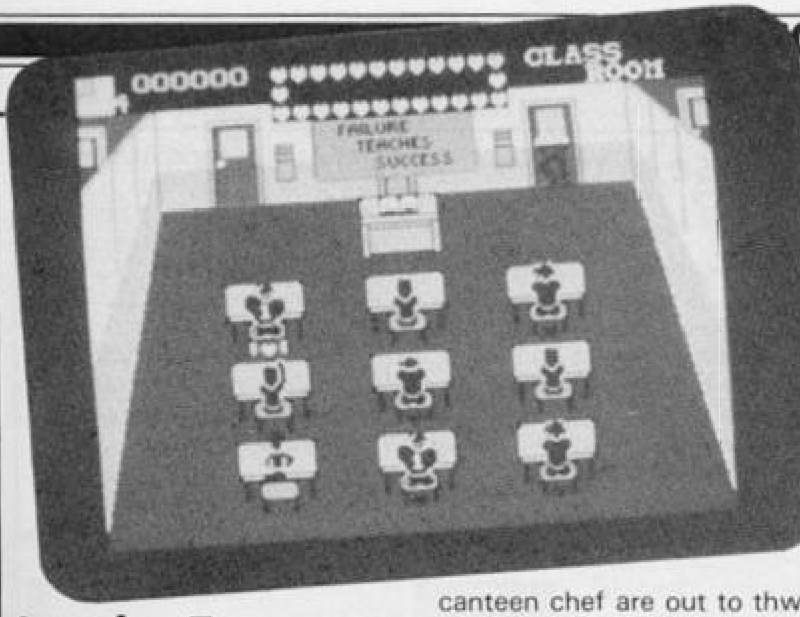
● Fancy a bit of a 'wreck-creation'? that's what Ariolasoft UK Ltd is promising with PANZADROME.

The concept is deceptively simple: the Panzadrome is an Island inhabited solely by robot tanks with varying levels of intelligence and viciousness. Your aim is to destroy it completely.

In Panzadrome over 200 enemy tanks, mines and mortars offer literally hundreds of ways to get yourself killed. And all against a special, totally wreckable 'Panzadrome' background (which you can repair with 'Polycrete'). Panzadrome costs £7.95.

● BALLBLAZER is a recent release from Activision. The year is 3097, and you are a contestent in the final round of the Interstellar Ballblazer Championship. For the first time a Terran has battled through the countless qualifying rounds to compete for the honour of his planet and the ultimate title any being can possess: Masterblazer.

Two players can play simultaneously or one player can take on one of nine practice Droid players, each with differing levels of skill. Available for £7.99.



Imagine Twosome

Imagine software, in conjunction with Konami, have released Mikie and Yie Ar Kung Fu.

Set in an American high school, the player takes on the role of Mikie, the school romeo. Mikie is trying to send a message to his girlfriend, but the teachers, maniac janitor and canteen chef are out to thwart his efforts.

The player must manipulate Mikie through the school's classrooms, locker rooms, canteen, gymnasium, and eventually the school yard. You have to collect hearts in these sections, and each heart represents a letter in Mikie's message which will be depicted at the top of the micro-screen.

Once the message is complete the bell rings, and Mikie can move on to the next section. Single hearts can be found on the floor or under stools — any class-mates can be moved over with a 'Hop Zap' — a pelvic flip accessed via simultaneous use of the direction and fire controls.

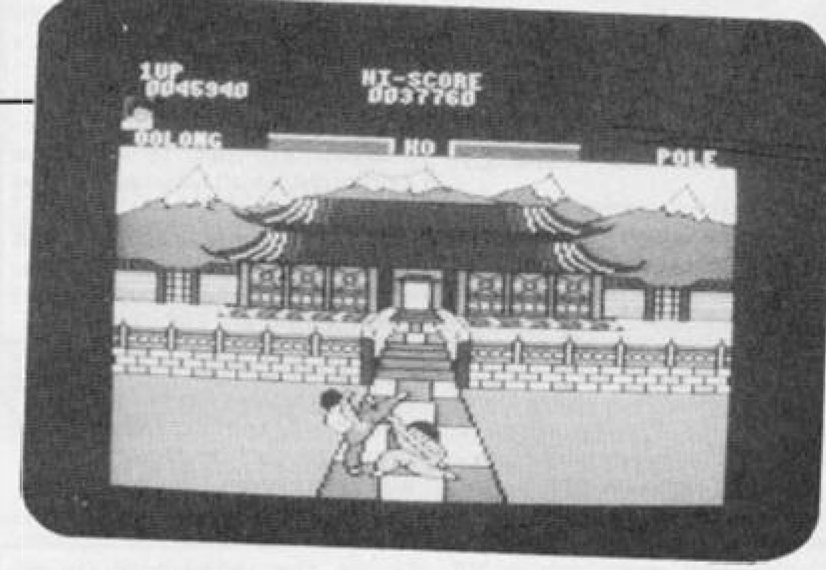
Assailants can be temporarily stunned by assaulting them with a chicken (!) or basket ball. But beware of the dancing cheerleaders. One kiss can render Mikie temporarily inactive! Even though this may appear a dated plot the game is great fun to play.

Yie ar Kung Fu's scenario is set in Japan, and the action takes place against two colourful backdrops — The mountain scene and the temple.

The objective of the game is to develop Kung Fu profiency, and become the grandmaster in the traditional martial arts skills. The player takes on the role of Oolong, who is set on becoming a grandmaster in order to honour the memory of his father. To achieve success Oolong must master the techniques of the sixteen different kick and punches — controlled by the player via the joystick or the keyboard.

Eight honourable opponents equipped with fearsome weapons await Oolong, including 'Star' a female warrior who can kill with a judiciously placed 'Shuriken' 'Blues' is the resident Kung Fu master, if the player can KO him, then the Grand Master title is his.

Yie Ar Kung Fu can be played via the joystick or re-definable keyboard controls. Each costs £7.95.



• DESERT RATS simulates the North Africa campaign in 1941-42, from the arrival of Rommel in Tripoli to the Battle of El Alamein. The bitter campaign includes Operations Battleaxe and Crusader and the Battle of Gazala.

It is a fast, interactive wargame with a scrolling map and six compelling scenarios, for 1 or 2 players. The game is packaged in an A5 video case, comes with a detailed instruction booklet which includes historical background notes on the campaign with maps and photographs, and is priced at £9.95 from CCS.

• SUPERMAN continues his constant battle to save the world. Darkside the arch enemy of mankind, thirsts for universal domination but he needs the anti-life formula. This awesome key is imprinted in the minds of certain humans. Darksied is on earth now and plots a reign of terror to achieve his ends. Only Superman (and you) can stop him.

So gather your wits, put your powers of concentration and courage to the test to help Superman foil Darksied's dastardly deeds. Available from US GOLD at £7.95.

• THE WORM IN PARADISE is now in the shops. 200+ pictures are included and it's the first game to use LEVEL 9's new adventure system.

• Bubble Bus have released a new budget game, BRAINSTORM, at £1.99.

Escape from Professor Brainstorm's Castle is your only hope of survival. The game is an arcade/adventure with 650 different locations, 28 varieties of Clones, 62 doors to find and open, using keys that are scattered around and 8 guardians of the tower — The Fire, The Plant, The Wolf's Head, The Eagle's Head, The Snake, The Teapot, The Boot and The Light Bulb.

Each one must be destroyed in turn by an appropriate weapon. There are 16 weapons in all, but eight are red herrings. Only three keys may be carried at any one time and only one of the special weapons. At the bottom of the screen there are two guages, one for Energy the other for Damage. Each time a clone hits you your Damage reading goes up, this can be repaired at the costs of some energy, or by finding a repair damage pod. If damage reaches maximum you loose a life.

Energy can be replaced by finding energy pods, but if you run out of energy your laser will be disabled. Extra lives may also be found.



Friday the 13th

A quiet holiday camp at Crystal Lake is disturbed when one of the campers, Jason, is drowned. His mother, distraught with grief, blames the other campers who did nothing to help him.

She vows revenge and murders all the holiday makers except one girl who kills her. The survivor floats into the middle of the lake where Jason, rises from the water, to take his revenge. Your task is complicated by having to find a sanctuary, identify and kill Jason who appears as a normal camper, in this new game from Domark, who produced A View to a Kill and Eureka.

The price is £8.95 and there are five Eureka colour monitors to be won in a free sound effects competition. The unique feature of these monitors is their ability to expand the game play area to fill the whole screen!

Each game tape has 10 sound effects recorded after the computer program. By identifying these sounds the purchaser has a chance to win one of these colour monitors.

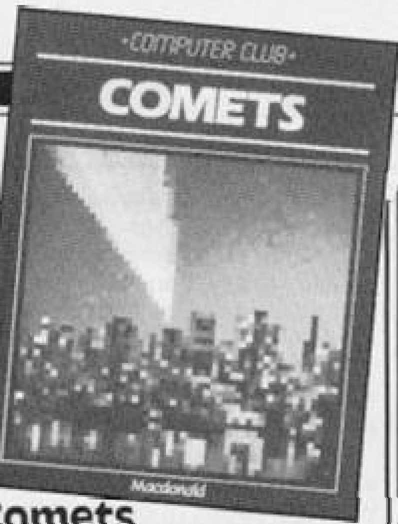
Astronomer's software

The book boom seems to be dying off and most new publications seem to be for various specialist markets. This one is no exception.

Written by Robert A Mackenzie and published by Sigma, it is a collection of Spectrum routines to perform the various calculations needed by all devotees of this subject.

The main programs are to enable astronomers to make predictions about the positions of the sun, moon, planets, satellites, stars and meteor's and analyse observations. A wealth of information is also given.

Very useful, and Mr. Mackenzie's pedigree (he is founder and director of the British Meteor Society, and a fellow of the Royal Astronomical and British Interplanetary Societies) lends weight to this book. It will cost you £8.95.



Comets

In the series called 'Computer Club', this is much less weighty than Astronomer's Software and is more at my level. Aimed at a much more general reader this is beautifully presented with fascinating facts and information, eye catching illustrations and simple demonstration programs.

The book is published by Macdonald at £5.95 and a tape of the programs can be obtained for £3.95 if you do not fancy entering them yourself.

This series is great in that they make a reasonably successful attempt to combine computing with other topics and hobbies. Invaluable in schools, and with an appeal which covers all ages, I recommend that you try and look them out at your bookshop.

Microcomputer Games Design

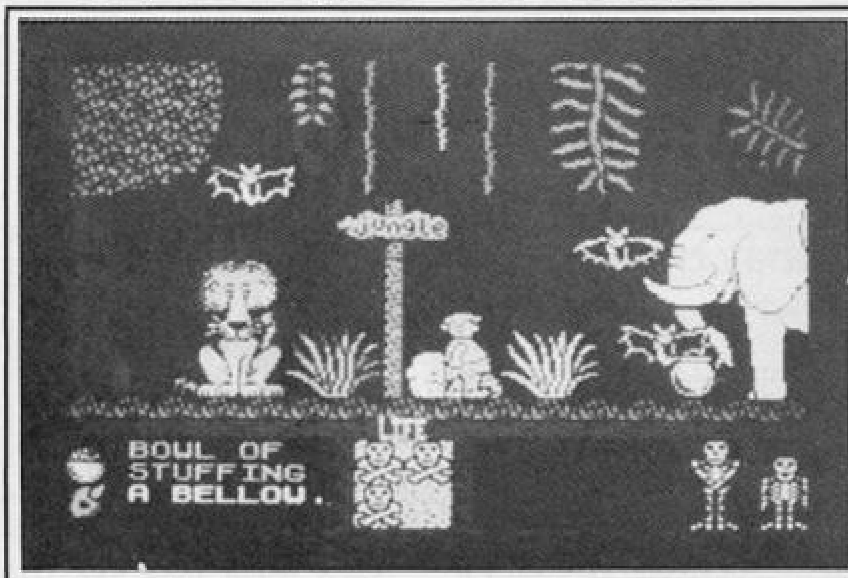
Subtitles 'for education and entertainment', this book is not a book of listings, but a general reading book for everyone interested in programming.

Michael Rigg wrote it and keeps the tone light, but discusses many of the aspects of this phenomena. Ideas are thrown out virtually from every page and, though you may not agree with all his statements, at least there is plenty of food for thought.

Not only does Mr. Rigg cover the logistics of games design, he also discusses languages, programming, specific utilities and programs such as Quill, Devpac and many more.

Here is that rare thing, a non-specific book which could even revive the jaded attitude of yours truly and reinstall that sense of excitement that I first had with the purchase of my ZX81..

At £6.95 from Sigma press I recommend it to you.



Get lost with Wally, Wilma and Herbert and make enough money for your dream holiday next year.
Three Weeks In Paradise *is the latest Wally venture following hard on the heels of such sucesses as Pyjamarama, Everyone's a Wally and Herbert's dummy run.*

A Mouse in the House?

On more expensive computers the use of a mouse for control, graphics and utility programs has been making some impact, Advanced Memory Systems have now produced their AMX Mouse for the Spectrum.

This neat little device comes complete with an interface which includes a Centronics printer interface and AMX Art, a drawing program and a good selection of utilities to enable it to be used in your own programs with the minimum of effort.

Available from AMS at Green Lane, Appleton, Warrington, WA4 5NG for a very reasonable £69.95 this could enhance your pleasure and operation of your computer.



A foxy keyboard

With the production of the Spectrum+ sales of keyboards have dropped, however Fox Electronics Ltd, of Fox House, 35 Martham Rd, Hemsbury, Nr Great Yarmouth, Norfolk, have brought out a new model based on their popular keyboard.

Most serious Spectrum users are still not satisfied with the keyboard supplied and this one from Fox is definitely worth considering if you want to improve your machine.

The 68FX2 Deluxe model is a very smart looking keyboard which at £49.95 is very reasonable. Featuring 68 good quality keys which have a solid fuel and satisfying click to them, Fox have done their homework well and all the peripherals we could find to try out operated perfectly with it. This includes Interface I and Microdrives.

The wide variety of additional keys are well planned and laid out and include Single Entry E Mode, Caps Lock, Graphics, Run, Break, Delete, Edit, Dot, Comma */.

A numeric keypad is also featured along with the essential full sized space bar. One criticism I have made in the past is the stick on key labels usually used on cheaper keyboards. The Fox unit has properly engraved key tops.

It is a useful size, 16 × 7 × 3 inches, with a slope from the rear to the front. Fitting is very simple and the instructions are idiot-proof, no need to feel worried about tampering with your machine if you are a complete newcomer.

The features it offers for the price asked makes it one of the best buys around at the time of going to press.

All Purpose Transfer Unit

Great news for all frustrated owners of storage media other than tape. A T and Y Computing Ltd have produced a unit which will provide a Ram Image Transfer Interface (R.I.T.I.) for most devices, Microdrive, Wafadrive, Technology Research Beta disk drive and the Opus Disk drive.

An R.I.T.I. makes a complete copy of the Spectrum's RAM and so, in theory, any program which has loaded, regardless of the protection built in, should transfer.

We had a quick try of the SPEC-MATE as they call it, and it performed well with the Wafadrive, Microdrive and TRL units which we have in the

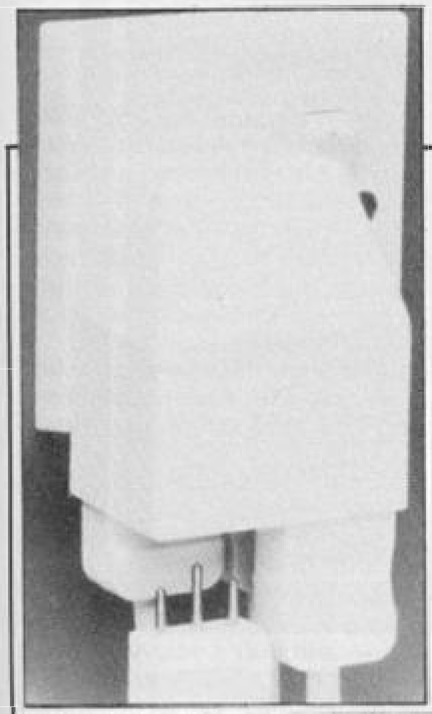
office. It is well designed and operation is simplicity itself, press a button and select the option for the device required and it does the rest. There are also options to save in special formats.

Well worth considering, although it may be worth bearing in mind that every time a better mouse trap is invented the mice soon get smarter!

Available from 35 Villa Rd. London, SW9 7ND.

● DEATHWAKE is the latest from Quicksilva. Set in the final stages of a terrible war, the player, as admiral in chief, has the awesome task of restoring the homelands' morale and preparing for the great victories needed to regain lost territory.

Arcade action and more than just a subtle hint of strategy combine to make Deathwake a game to watch out for. Deathwake will cost £7.95.



Socket top me!

A rather upmarket system is the one from Coniblock electrical Ltd. who provide a six way, mini plug mains board complete with plugs and a four into one wall plug featuring the same plugs and which are therefore interchangable.

The six way unit contains PCB's which help to reduce the weight by some 60%, and the size by some 30%.

Available in most electrical stores, all Conblock need to do now is to get their press agents to include the price on their press releases . . .





Philips monitor the market.

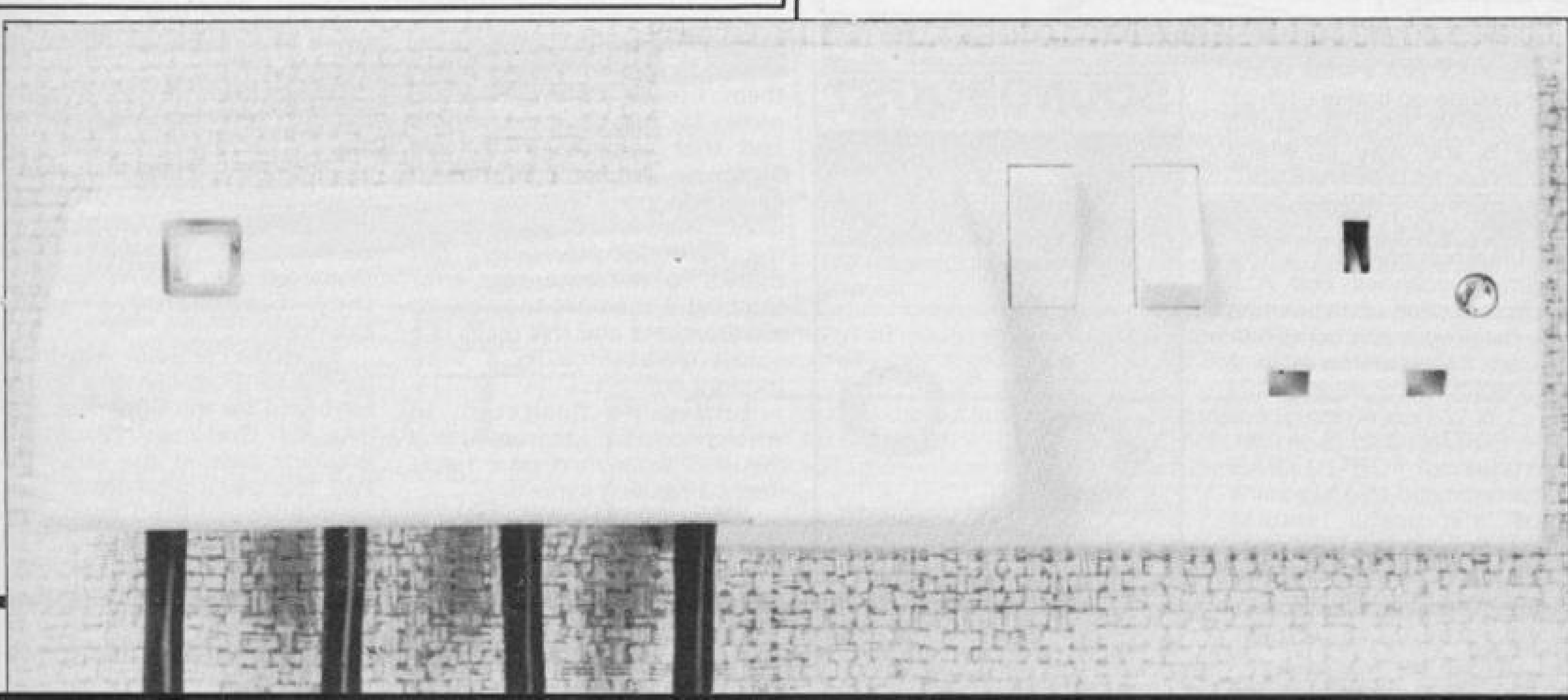
Philips have introduced a new range of colour monitors for a wide range of computers. QL owners may be interested and so may fanatical Spectrum owners.

A choice of composite video or RGB is offered, but on the two top of the range models both are included as standard. Unlike computer prices, Monitor prices have remained pretty constant and at £220, £245, £280, and £325 for their CM8500, CM8501, CM8524 and CM8533 respectively they are not overpriced. Pictured is the CM8524, a standard resolution model.

A plug for duraplug

If, like me, you end up wondering where to plug in all your bits and bobs, computer, TV, Tape recorder, possibly a printer and disk drive, then Duraplug have come up with an alternative to the bulky square adaptor or long four in a row socket.

Called the MultiLine plug, you wire four units directly into the plug, it even features a 'main on' indicator light. It looks to be a very useful unit and at around £5.00 it is nearly a quarter of the price of buying a four in a row and four 3 pin plugs.



'Hardware'

'ZX looks at some new add-ons for the Spectrum.'

We are used to extravagant claims here at ZXC, and when this small wedge shaped bit of plastic with an edge connector on the thin end arrived we were not terribly excited. Even Rodney Holland's glowing letter — 'extraordinary . . . grand title product . . . over £18,000 and eight months to develop' — only raised a knowing glance.

But as a serious programmer on the Spectrum I was in for a treat, this is a little marvel!

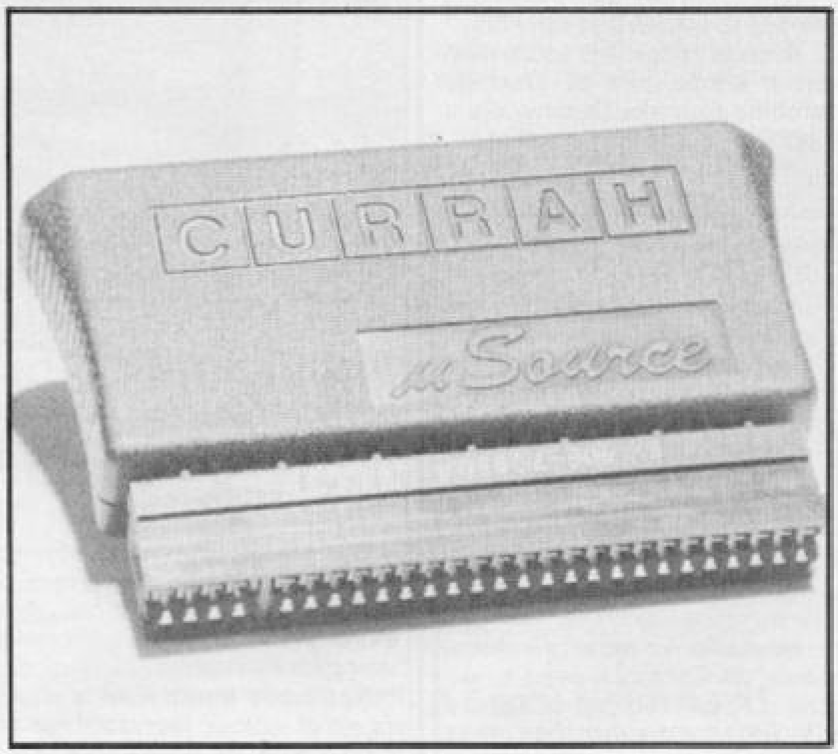
What is Microsource? Well, it is really three units in one which combine to produce one of the most powerful tools for the dedicated programmer. The unit provides you with an ASSEMBLER, a FORTH interpreter and a versatile DEBUG or Monitor.

Accompanying it is a 38 page manual which provides all the instructions needed to operate the beast and is satisfactorily clear and concise. As with all similar programs no attempt to teach machine code or FORTH programming is made and the user is either already proficient or will have to learn from another source.

The assembler produces stand alone code which is portable while the FORTH interpreter is machine (or unit) dependent. Both can be used from within BASIC and commands for each are held in REM lines, Assembler prefixed by '!' and FORTH by '#', and BASIC variables can be used to pass parameters to and from either.

The assembler is a two pass assembler and all Z80 Op codes are supported, plus a wide selection of pseudo op codes such as DEFB, DEFW etc. A useful feature is the way in which operands can be typed as BASIC expressions. When the assembler is called (by LET assemble = number) the whole program is scanned and ALL code, irrespective of its position within the program, is compiled. This can be assembled as a direct command or during RUN time.

The FORTH used is an implimentation of FORTH 79, is 16 bit integer and also has some unusual and useful features such as allowing the USR command to call machine code.



Unlike the assembler, the FORTH compiler only compiles the code following the command, most usefully from within a program, and stops when it reaches the next Basic command.

The only disadvantage with this language is that you must have a Microsource unit attached, as, unlike the assembler, FORTH does not generate code which can be used independently.

Finally, the Debug utility is easy to use and performs all the tasks you are likely to require from such a program, including single stepping breakpoints and memory manipulation.

Any of these features could be obtained as individual programs, but apart from the constraints of having to load them and the memory they would occupy, having all three together and available instantly makes the Microsource very powerful. You could, for example, write a program in Basic and then modify sections to FORTH or assembly so that all three types of code exist in the same program yet still be able to run and use it.

A tremendous amount of thought has been put into this product, it is compatible with microdrives and Interface 1 and commands and options are included to make the best use of them. I really have nothing but praise for this device, but I did find that sometimes my bad habits caused some confusion, for instance I wrote 'JRNZ label'. The assembler insisted on the form 'JR NZ, label', but thanks to the extensive error trapping, I soon got to know its requirements and this really is a small quibble with a well thought out unit.

I have no hesitation in wholeheartedly recommending this unit to anyone who takes their computing seriously.

Quadhouse Computers UK.
Regent House, Victoria Rd,
Middlesbrough, Cleveland
TS1 3HX.
Price: £14.00

SOUNDBOOST



Big Beeps

The Soundboost unit from SSL is a small circuit board with three coloured leads ending in press-on clips attached to it. The circuitry modifies the Spectrum sound generation and outputs it through the TV speaker, tough luck if you've lashed out on a proper monitor!

Attaching the gizmo was very easy, but may cause concern as it means you invalidate the guarantee by opening the Spectrum's case. Unscrew case screws, separate case halves, position unit and attach leads as per instructions — which include a good diagram for those among us of a nervous disposition — and Bob's your uncle.

Before reconnecting the two halves of the case it is worth entering a BEEP command, turning up the TV volume and then adjusting both the TV tuning and a little fine tuning on the unit to get the best sound you can.

Fitting is that simple, and it worked. Unfortunately, the sound is very poor. I tried it on two Spectrums, each with its own different, TV. Tuning is a very precise job but even at the best possible combination of settings the background noise was so high as to be extremely irritating. When the volume was lowered so that the background hiss was unobtrusive then the level of sound was only about twice as loud as the Spectrum beeper.

Worse was to follow, over the next few days the unit and the TV consistantly needed to be re-tuned and I was beginning to experience SAVE/LOAD problems. I'm not saying the unit caused them, but when I eventually gave up and removed it, they disappeared — coincidence?

From the company who have produced possibly the finest keyboard for the Spectrum and one of the most exciting graphics aids in the Graphics Pad, this was a great disappointment and, at £9.95 cannot be recommended.

Ray Elder

Cheetah Marketing

are proud to announce the arrival of their 125 Joystick

Compatible with ZX Spectrum, Commodore 64, Vic 20, Amstrad, Atari, MSX, etc.

At only £8.95 the features on the 125 are second to none. Besides its unique internal structure, built to withstand immense punishment from even the most vigorous games player, the joystick contains no less than four extremely sensitive fire buttons. Two are housed in the handgrip which has been moulded for extra comfort and ease of operation. The trigger finger fire button provides ease and comfort for your finger and the top fire button is contoured to fit your thumb for sure fire shooting. The base fire buttons are positioned for extra control and two hand firing whether you are right or left handed.

A built in auto-fire switch provides continuous shooting at the touch of a fire button.

The 125 comes complete with a full 12 months warranty and is available from High Street stores and all good computer shops.

ONLY £8.95



125 SPEED AHEAD

with this NEW JOYSTICK from

Price include VAT, Postage and Packing. Delivery normally 14 days.
Export orders at no extra cost. Dealer enquiries welcome.
Send cheque/PO now to:-

Cheetah Marketing Ltd.
1, Willowbrook Science Park, Crickhowell Road, St. Mellons, Cardiff
Telephone: (0222) 777337 Telex: 497455

RELEASE THE POWER OF THE QL

QL C £99.95 inc VAT

A professional specification C compiler for the QL! Designed by LATTICE®, QL C is the most powerful and complete C compiler available for the QL.
► Complete Kernighan and Ritchie implementation. ► Full floating point arithmetic. ► Comprehensive library of UNIX and QDOS functions. ► Separate compilation. Linker. ► Powerful data types (inc. structures and arrays). ► Macros and conditional compilation. ► Over 90 detailed error messages.

ASSEMBLER £39.95 inc VAT

The best selling macro assembler for the QL!
► Full Motorola 68000 specification. ► Macro expansions. ► Linker, directives, conditional assembly, and many other professional features.

BCPL £59.95 inc VAT

A true compiler. Ideal for systems programming - utilities, games, and applications.

QL PASCAL £89.95 inc VAT

A full ISO standard Pascal compiler!
► Fast, single pass Pascal compiler ► Complete implementation of the ISO 7185 Pascal standard. ► Generates native code. Can be linked to assembler modules. ► Comprehensive error handling. ► Easy interfaces to QL features.

LISP £59.95 inc VAT

LISP interpreter for exploring 'the language of artificial intelligence'; with graphics.

Every DEVELOPMENT KIT includes Metacomco's popular screen editor and a detailed manual. All KITs will operate either on a standard QL or on QL's with floppy disks or memory expansion.

Available from W.H. Smith, John Lewis, HMV, Menzies and many computer stores or direct from Metacomco.

METACOMCO
26 Portland Square, Bristol BS2 8RZ
Tel: Bristol (0272) 428781
In the USA call 1-800-252-6382

Trademarks: UNIX-AT+T Bell Laboratories; QL, QDOS - Sinclair Research Limited.

Price includes VAT, postage and packing UK mainland only. Delivery, allow up to 28 days.

Phone today or post this coupon to: Metacomco, 26 Portland Square, Bristol BS2 8RZ.
Please send me: Assembler £39.95 ☐ LISP £59.95 ☐ BCPL £59.95 ☐ QL C £99.95 ☐ QL PASCAL £89.95 ☐ more information ☐ I enclose a cheque for £ ______ or debit my ACCESS/VISA No: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ CARD EXPIRY DATE ______
NAME
ADDRESS
POSTCODE TEL. NO: SIGNATURE ZX1

QL Business Software



Good software of any description has been slow to appear for the Sinclair QL. But as the QL was primarily intended as a business micro, this software famine has had a particularly deleterious effect on QL sales. Fortunately, business software is starting to appear. One of the first producers is a company by the name of Triptych Publishing. They have produced a series of packages called the 'Brainpower' range. There are currently three programs in the range for the QL, *QL Entrepreneur, QL Project Planner*, and *QL Decision Maker*. These packages each cost £39.95, and are sold under the Sinclair label.

All these packages are sold in the standard Sinclair 'black box'. Tilt the box, and a loose leaf folder drops out containing the instruction manual and microdrive wallet. Each package is supplied with four microdrives, these being a mixture of training courses, application programs, and one spare cartridge for backup. The applications will not work without first backing up the program, but you have to find the information at the back of each manual on how to do this.

Each package is primarily intended as a training course, but you also get one or more application programs which allow the user to put business theory to practical use.

Entrepreneur

Entrepreneur is aimed at the embryonic businessman; it tries to focus the mind on how to start a business. The 128 page manual is easy to follow. It starts with a very comprehensive list of items which the potential entrepreneur must address to form his or her business plan. The list is so long that it is sure to put off all but the most resolute, but highlights the fact that tremendous thought and planning must go into a business idea if success is to be achieved.

There is one tutorial program with *Entrepreneur*; this explains the principle balance sheets. If you know absolutely nothing about the subject, then following the manual and the well formatted screen displays, you should acquire a basic knowledge in a couple of hours.

Entrepreneur's two application programs are similar; they allow you to develop a financial plan of the future business. In so doing, several financial concepts are introduced and explained well. The programs (one is for a single product business, the other for a business with multiple products) expect you to enter all the relevant information. Questions are clear, and they are carefully presented as a checklist in the manual. The program then analyses all this data to produce a series of financial reports. These will tell you if your plans are sound or if some modifications are needed. Your bank manager should be sufficiently impressed to grant the loan you need to get started! And, if you're just an armchair entrepreneur, then there are some examples in the book to try; they'll give you a surprisingly good feel for the demands of setting-up a new business.

Getting started

Starting a business is one area where you need a sound plan of action, as well as finance. You'll need action plans for any project once the business is off the ground too. If there are several activities in a project which are interdependent, all requiring time and effort, then you'll need to plan the most effective sequence of actions in order to complete the project in the time allowed, and within budget. The technique of critical path analysis is one powerful way of planning and controlling a project, and 'Project Planner' teaches you the principles of this technique on two tutorial microdrive cartridges (again, used effectively with the manual). A third cartridge gives you an application program to plan your own project, or to just try one or more of the examples given in the manual.

By telling the computer the activities which will be involved in the project, how long they will take, how many people will be involved in the project, and how the activities interact (e.g. which jobs must be completed before others can start), a 'network' is constructed. Where you have more time to complete a job than the job should take, you wlll have 'float' (spare time). But there will be one or more series of jobs where there is no time to spare; there are the critical activities, and the planner knows that he has to manage these more carefully to ensure that the project goes to plan.

Project Planner presents the network to you in a number of ways, as a network, bar charts or tables. If you decide to alter the plan (you have a bright idea on how to improve the plan) then you can alter the design and logic of the network, get a new set of analyses from the computer, then decide for yourself exactly what will be the better option.

Again, *Project Planner* is excellent for the business student, who should gain a very good appreciation of the principle and practise of network analysis. It also allows the user to develop and refine plans before the start of projects. Its limitation, compared with far more expensive project planning programs on 'real' business micros, is the apparent inability to help in the management of on-going projects. Once a project is underway, inevitably there are problems, or, on the other hand, activities which are completed faster than planned. There appears no way to feed status information into program, and receive reports on their effect on the network. The printout of the jobs list, in the form of a table or bar chart, is available. Unfortunately, critical activities are not highlighted on the printout (although they are on the screen), so it's a bit difficult to find them in a long list. Bar chart printouts are hard to read as they lack a grid to help you judge the position of bars. Still, the program doesn't cost $100+ as others do, and too much should not be expected. But, these are limitations of which serious users should be aware.

Decision Maker

Perhaps the one program of the three which could be used by both students and businessmen alike is *Decision Maker*. The program is based upon the principle of decision trees and risk analysis. Any decision one makes can have a number of chance outcomes; each one of these may require further decisions or result in more outcomes, each with some probability of actually occuring. So, from one decision stems several outcomes and further decisions. draw these diagrammatically, and you get a decision tree. Add the costs (or profits) associated with each outcome, and hazard some guess at the probability of chance outcomes actually occuring, and you end up with all the requirements to calculate the best decision. To check that the decision is 'best', two further techniques called 'risk' and 'sensitivity analyses' are applied by the program.

In actual fact, the mathematics involved (and all the program really does for you is to do the sums) is quite trivial, and once you know the rules, then most simple decision trees can be solved in a few minutes with a calculator. The logic of constructing and decision tree, and adding the required data are left entirely to you, but, of course, the program helps to draw (and produce on a Epson printer) some neat decision trees, and if you dislike maths, then all the hard work is done for you.

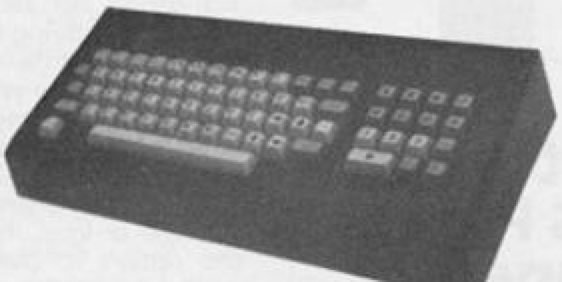
So, in much the same way as the other members of the 'Brainpower' series, *Decision Maker* is a computer aided tutorial system with a relatively unsophisticated application program which allows the theory to be applied. As tutorial packages, all three are excellent, although the price of each must be considered high when compared with standard text books on these subjects. All three application programs are somewhat limited, but, again, serve the student well to practise the theory supplied by the tutorial programs. But, workhorse business programs, unfortunately, they are not.

David Nowotnik

KEYBOARDS

SPECTRUM REPLACEMENT

THE 68FX2



ONLY £39-95 INCL.

WE ARE NOW ABLE TO OFFER THIS TRULY SUPERIOR KEYBOARD AT THIS EXTRA SPECIAL PRICE **£39-95**
THIS KEYBOARD IS FANTASTIC
ITS FEATURES INCLUDE:

* FULL SIZE SPACE BAR
* INDIVIDUAL GOLD PLATED KEY-SWITCHES
* SINGLE ENTRY KEYS INCLUDE FULLSTOP, SHIFT LOCK, EXTENDED MODE, COMMA, FULLSTOP, EDIT DELETE BREAK, MINUS, *, RUN DIVIDE AND CURSOR CONTROLS
* ¼ THICK PLASTIC CASING
* SIMPLE STEP BY STEP INSTRUCTIONS

ALL FOR THIS UNBELIEVABLE PRICE OF **39-95**

WE STILL HAVE SOME 68FX1 LEFT THESE ARE AS ABOVE BUT WITHOUT EXTENDED MODE, DIVIDE COMMA + MINUS ON SINGLE ENTRY KEYS ONLY

LIMITED STOCKS **£20-95** + 2-00 P&P

SEND NOW TO
FOX ELECTRONICS LTD
FOX HOUSE
35 MARTHAM RD
HEMSBY
GREAT YARMOUTH
NORFOLK NR2 94NQ

JOYSTICK INTERFACES

FOR THE SPECTRUM

THE ULTIMATE
THE FOX PROGRAMME JOYSTICK INTERFACE:-



What the review said...
SINCLAIR USER FEBRUARY 1984
"Provides the easiest interface on the market to use"
SINCLAIR USER ANNUAL 1985
"At £28.95 the interface is excellent value"
ZX COMPUTING JANUARY 1985
"One of the easiest to use, get my approval"

THE FOX PROGRAMMABLE INTERFACE — AN INTERFACE WITH

* Complete compatibility with all programs.
* In-built memory to store up to 16 different games keysets at one time.
* Battery back-up so no loss of memory after power off. (Battery recharge during loss so no replacements are required).
* One switch only for simplicity of use.
* Full casing.
* Through port for further expansion.
* Proven compatibility with the microdrive.
* Built-in pseudo Rom facility with Rom for personnel tool kit.
* Compatible with all Atari-type joysticks.
* Compatible with Quickshot II rapid fire.

THE INTERFACE THAT ONCE PROGRAMMED NEVER NEEDS PROGRAMMING AGAIN!!!

NO TAPES!! NO LEADS TO CHANGE !!
JUST FLICK THE SWITCH AND PLAY THE GAME WITH FOX

SPECIAL OFFER ONLY!!
£28.95 INCL.

SPECIAL OFFER
BUY THE ABOVE INTERFACE WITH THE QUICKSHOT II JOYSTICK FOR ONLY
£34-95

OR BUY OUR STANDARD JOYSTICK INTERFACE

(KEMPSTON TYPE) ONLY £7-95 INCL

WITH QUICKSHOT II JOYSTICK £15- INCL

OR QUICKSHOT I JOYSTICK £13-75 INCL

SPECTRUM UPGRADE

ONLY £22-50 INCL.

16K TO 48K
(ISSUE 2 or 3 please state)

IN ONE SIMPLE KIT

PLEASE SEND ME:-

68FX2 KEYBOARD □
68FX1 KEYBOARD □
PROGRAMMABLE INTERFACE □
Q/S II + PROG. INTERFACE □
STANDARD INTERFACE □
STANDARD + Q/S II □
SPECTRUM UPGRADE □

Name ....
Address ....

I enclose £ ....
or Debit my Barclaycard/Access

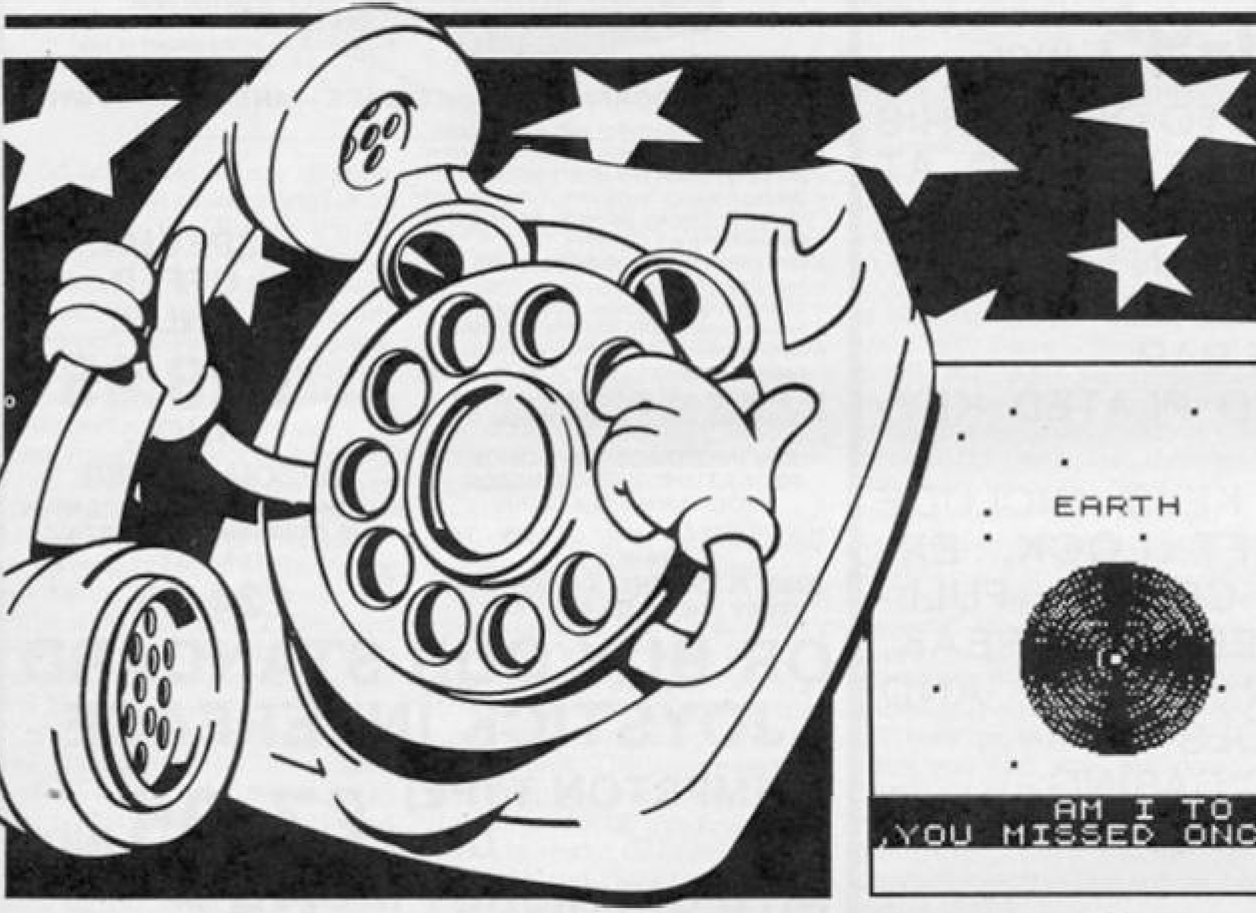
Alien!

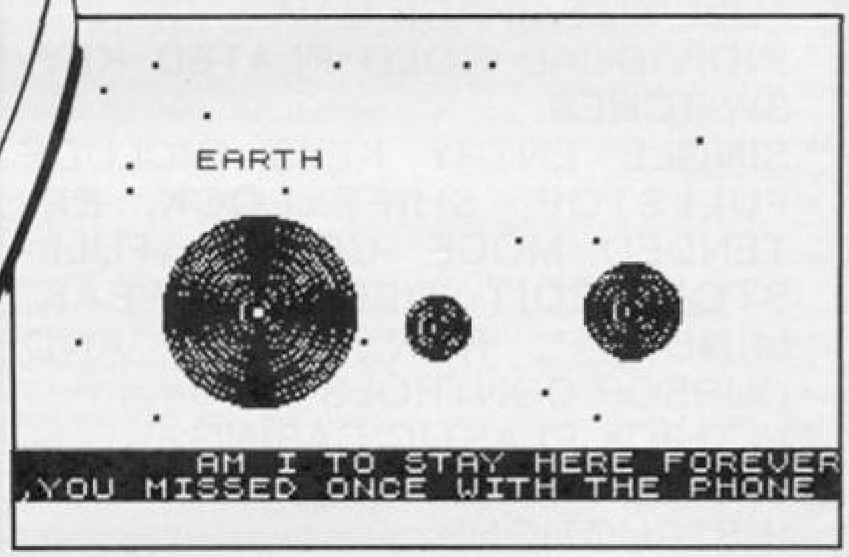
A Strange Being has been spotted by Nicholas Pearson as it searches Potters Bar for a working telephone.

This is a great game for younger members of the family (*I liked playing it! — Ed*). The idea is to guide the telephone which continually descends from the sky (A UFOne?) onto the head of the wandering non-terrestrial. No, you are not trying to brain him, but provide him with the means to communicate with his home planet (have you seen the telephone company's Intergalactic charges?).

After each attempt, whether you win or lose, the player has the option to play again immediately (if he's impatient) or to see the appropriate end-of-game graphics. And finally, for those who are very slow, there is a "Hold the phone" feature which slows the game down. Brief but complete instructions are given by the program so you've seen the film, read the book now etc, etc.

NB. Is a telephone engineer a phoney?






```
   1 REM ***********************
         *Underlined characters*
         *are entered in       *
         *GRAPHICS mode.       *
         ***********************

   3 BORDER Ø: PAPER Ø: INK 6: C
LS
   4 GO SUB 9ØØØ
  24 RANDOMIZE : CLS
  25 BORDER Ø: PAPER Ø: INK 6
  35 PRINT AT 3,13; FLASH 1;" AL
IEN "
  4Ø INK 6: PRINT : PRINT  INVER
SE 1;"S"; INVERSE Ø;"AVE THE ALI
EN BY LANDING YOUR   TELEPHONE O
N HIS HEAD E.G.'EF'  BEWARE YOU
ONLY HAVE 1 GO AND   HE MIGHT NO
T NOTICE THE PHONE   THEN. PRESS
 s TO PLAY            CONTROLS  A
RE 8 RIGHT AND 5      LEFT"
  45 PRINT : PRINT ; FLASH 1; IN
VERSE 1;" YOU CAN HAVE THE ~HOLD
 THE LINE FEATURE BY PRESSING 'h
'THIS      SLOWS THE DECENT OF TH
E PHONE    DOWN
          "; FLASH Ø; INVERSE Ø;
  5Ø BORDER Ø: PAPER Ø: INK 6
  55 FOR a=Ø TO 29
  6Ø PRINT AT 21,a;"E"
  65 INK 4: PRINT AT Ø,a;"E"
  7Ø INK 4: PRINT AT 21,Ø;"E"
  75 PRINT AT 17,a;"EF";AT 18,a;
"AB";AT 19,a;"CD"
  77 IF INKEY$="S" OR INKEY$="s"
 THEN  GO TO 82
  8Ø NEXT a
  81 GO TO 25
```

```
  82 CLS : BORDER 6: PAPER 5: IN
K Ø
  83 PRINT ; INVERSE 1;AT 4,Ø;"
 BEWARE THE '*' IF YOU TOUCH IT
 YOU LOOSE. DON'T WORRY IF YOU
 RUB THEM OUT.                "
  84 PRINT : PRINT " YOU ARE ABO
UT TO START PREPARE!"
  89 PAUSE 25Ø
  9Ø BORDER Ø: PAPER Ø: INK 6
 1Ø1 CLS
 1Ø5 REM
 1Ø6 REM ***    GAME     ***
 11Ø REM *** MOVEMENT ***
 12Ø REM
 13Ø LET x=INT (RND*2Ø)+1
 14Ø LET a=1: LET b=1
 15Ø FOR w=Ø TO 6
 16Ø LET d=INT (RND*3)+8
 17Ø LET c=INT (RND*29)+1
 18Ø PRINT AT d,c;"*"
 19Ø NEXT w
 2Ø8 PAUSE 1ØØ
 2Ø9 LET s=Ø.2
 211 FOR g=Ø TO 2Ø
 214 LET a=a+1: LET b=b+1
 215 LET x=x-(INKEY$="5" AND x>Ø
)+(INKEY$="8" AND x<19)
 225 IF INKEY$="h" THEN  LET s=s
+Ø.2
 23Ø LET v=b
 235 IF b=18 THEN  GO TO 35Ø
 236 IF SCREEN$ (v,x)="*" THEN
GO TO 38Ø
 238 IF SCREEN$ (b,x+1)="*" THEN
  GO TO 38Ø
 24Ø BEEP s,b+1: PRINT AT v,x;"I
";AT b,x+1;"U";AT b-1,x;"  ";AT
b-1,x-1;"  ";AT b-1,x+1;"  "
 245 LET s=Ø.Ø3
 25Ø PRINT AT 16,29;"  ";AT 17,2
9;"  ";AT 18,29;"  "
 26Ø PRINT AT 16,a;"EE";AT 16,a-
1;" ";AT 17,a;"AB";AT 17,a-1;" "
;AT 18,a;"C";AT 18,a+1;"D";AT 18
,a-1;" "
 27Ø PRINT AT 2Ø,15; INVERSE 1;"
 HOME !!!! "; INVERSE Ø
 28Ø PLOT Ø,2Ø: DRAW 255,Ø
 29Ø IF b=16 AND a=x THEN  GO TO
 31Ø
 3ØØ GO TO 2Ø9
 31Ø INK 5: PRINT #Ø; INVERSE 1;
" YOU HAVE WON DO YOU WANT TO
  START THE GAME IMMEDIATELY(Y/N
)"; INVERSE Ø
 32Ø LET Ln=93ØØ: GO TO 5ØØ
 35Ø INK 5: PRINT #Ø; INVERSE 1;
" YOU HAVE LOST DO YOU WISH TO
  IMMEDIATELY START AGAIN   (y/n
)"; INVERSE Ø
 36Ø LET Ln=96ØØ: GO TO 5ØØ
 37Ø PAUSE 1ØØ: GO TO 96ØØ
 38Ø INK 5: PRINT #Ø; INVERSE 1;
" YOU BLEW UP THE PHONE DO YOU
  WANT TO START THE GAME AGAIN
  IMMEDIATELY WITH A NEW PHONE
"; INVERSE Ø
 39Ø LET Ln=9675
 5ØØ LET Z$=INKEY$
 51Ø IF Z$="y" OR Z$="Y" THEN  G
O TO 24
 52Ø IF Z$<>"n" AND Z$<>"N" THEN
  GO TO 5ØØ
 53Ø CLS : GO TO Ln
8997 REM
8998 REM * USER DEFINED GRAPHICS
8999 REM
9ØØØ RESTORE
9ØØ2 FOR i=USR "A" TO USR "F"+7
9ØØ3 READ v: POKE i,v: NEXT i
9Ø15 DATA BIN ØØØØØ111,BIN ØØØØØ
Ø11,BIN ØØØ11111,BIN Ø1111111,BI
N Ø1111111,BIN Ø11ØØ111,BIN Ø11Ø
1111,BIN Ø11Ø1111
9Ø2Ø DATA BIN 111ØØØØØ,BIN 11ØØØ
ØØØ,BIN 11111ØØØ,BIN 1111111Ø,BI
N 1111111Ø,BIN 111Ø111Ø,BIN 1111
Ø11Ø,BIN 111ØØ11Ø
9Ø25 DATA BIN 111Ø1111,BIN 111Ø1
111,BIN Ø11Ø1111,BIN ØØØ11111,BI
N ØØØ11111,BIN ØØØ11ØØØ,BIN ØØ11
1ØØ,BIN ØØ111ØØØ
9Ø3Ø DATA BIN 1111Ø111,BIN 1111Ø
111,BIN 1111Ø11Ø,BIN 11111ØØØ,BI
N 11111ØØØ,BIN ØØØ11ØØØ,BIN ØØ11
ØØ,BIN ØØØ11ØØ
9Ø32 DATA BIN ØØØ11111,BIN ØØ111
111,BIN Ø1111111,BIN 111ØØ111,BI
N 111ØØ11Ø,BIN 11111ØØ1,BIN ØØØ1
11ØØ,BIN ØØØØ1111
9Ø33 DATA BIN 1111ØØØØ,BIN 11111
ØØØ,BIN 1111111Ø,BIN 111ØØ111,BI
N Ø11ØØ111,BIN 1ØØ11111,BIN 1111
11ØØ,BIN 1111ØØØØ
9Ø34 FOR B=USR "T" TO USR "U"+7:
 READ v: POKE B,v: NEXT B
9Ø35 DATA BIN ØØØØØØØØ,BIN ØØ111
111,BIN ØØ111111,BIN ØØ11ØØ11,BI
N ØØ11ØØ11,BIN ØØØØ1111,BIN ØØØ1
1111,BIN ØØ111111
9Ø4Ø DATA BIN ØØØØØØØØ,BIN 11111
1ØØ,BIN 111111ØØ,BIN 11ØØ11ØØ,BI
N 11ØØ11ØØ,BIN 1111ØØØØ,BIN 1111
1ØØØ,BIN 111111ØØ
```

▶

```
9042 FOR W=0 TO 7
9043 READ S
9044 POKE USR "N"+W,S
9045 NEXT W
9046 DATA BIN 00011110,BIN 00011100,BIN 01111011,BIN 01111110,BIN 01011100,BIN 00111100,BIN 01101100,BIN 11011100
9047 RETURN
9300 REM
9310 REM *** THE WINNING ROUTINE
9320 REM
9340 PAUSE 100
9355 LET e=0
9356 LET e=e+1
9360 INK 4: PLOT 0,e: DRAW 255,0
9365 IF e=100 THEN  GO TO 9368
9367 GO TO 9356
9368 INK 3: PRINT AT 8,0;"N"
9370 INK 5: PRINT AT 7,12;"▟    ▙ ";AT 6,11;"██   ██"
9372 PRINT AT 5,11;" ██████ ";AT 4,11;" ▄█████▄ "
9440 BEEP 1,2: BEEP 0.3,12: BEEP 0.4,12: BEEP 0.4,11: BEEP 0.4,12: BEEP 0.8,11: BEEP 1,7
9450 PAUSE 30
9460 BEEP 1,2: BEEP 0.8,12: BEEP 0.4,12: BEEP 0.4,11: BEEP 0.4,12: BEEP 0.9,14: BEEP 1,11
9470 PAUSE 30
9480 BEEP 1,2: BEEP 0.8,12: BEEP 0.4,12: BEEP 0.4,11: BEEP 0.4,12: BEEP 0.8,11: BEEP 1,7
9490 PAUSE 20
9500 BEEP 0.8,12: BEEP 0.8,7: BEEP 0.8,12: BEEP 0.3,11: BEEP 1,11
9510 LET a=0
9515 LET a=a+1
9520 IF a=15 THEN  GO TO 9550
9522 INK 3: BEEP 0.03,a: PRINT AT 8,a;"N";AT 8,a-1;" "
9523 FOR b=8 TO 3 STEP -1
9524 GO TO 9515
9548 REM
9549 REM *** GO HOME ***
9550 REM
9552 PRINT AT 8,14;" "
9555 LET b=8
9560 LET b=b-1
9565 PRINT AT b,15;"N";AT b+1,15;" "
9570 IF b=6 THEN  GO TO 9580
9575 GO TO 9560
9580 INK 5: PRINT AT 10,0;"NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN";AT 11,0;"     BE GOOD !!!!     "
9585 PRINT AT 12,0;"NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN"
9590 PRINT : PRINT
9592 PRINT  INVERSE 1;AT 14,8;"EF";AT 15,8;"AB";AT 16,8;"CD": BEEP 0.09,1: PRINT AT 16,8;"  ";AT 15,8;"  "
9595 PRINT : PRINT " EF DO YOU WANT ANOTHER GO EF "
9596 LET Ln=9999: GO TO 500
9610 REM
9611 REM *** THE LOSER ROUTINE *
9612 REM
9613 PAUSE 100: PAPER 0: INK 1: CLS
9614 FOR a=0 TO 20
9615 LET c=INT (RND*28)+1
9616 LET b=INT (RND*18)+1
9617 PRINT AT b,c;"."
9618 NEXT a
9620 FOR a=2 TO 30
9630 INK 4: CIRCLE 75,75,a
9632 NEXT a
9634 FOR b=0 TO 15
9636 INK 6: CIRCLE 190,75,b
9638 NEXT b
9640 FOR c=0 TO 10
9642 INK 5: CIRCLE 130,70,c
9643 NEXT c
9659 INK 4: PRINT AT 6,6; INVERSE 1;" EARTH "; INVERSE 0
9660 PRINT AT 18,0; INVERSE 1;" EF EF EF AM I TO STAY HERE FOR EVER.YOU MISSED ONCE WITH THE PHONE DO YOU WANT ANOTHER GO    (y/n)"; INVERSE 0
9663 LET Ln=9999: GO TO 500
9675 CLS : PRINT ; FLASH 1;AT 2,5;" YOU DONE IT NOW !!!"
9680 FOR x=46 TO 0 STEP -2
9682 PLOT 0,x: DRAW 255,0
9684 NEXT x
9686 FOR x=10 TO 25
9688 BEEP 0.02,x: PRINT AT 15,x;"N";AT 15,x-1;" "
9690 NEXT x
9695 PRINT ; FLASH 0;AT 4,0;" HE HAS STARTED TO SULK.HE WANTS  TO PHONE HOME BUT HOW CAN HE    DO THAT WITH NO PHONE."
9700 PRINT : PRINT "    WILL YOU HELP HIM AND START   THE GAME AGAIN (y/n)"
9702 PLOT 0,85: DRAW 255,0
9710 LET Ln=9999: GO TO 500
9999 STOP
```

The WINNERS

of the ASP DREAM HOLIDAY Competition



Argus Specialist Publications Ltd. are pleased to announce the winners of the fabulous Dream Holiday Competition.



FIRST PRIZE

-a holiday anywhere in the world up to a value of *£2,500* has been awarded to Mr K. Gouldthorp of 2 Woodside Road, Radcliffe-on-Trent, Nottingham NG12 2HJ.

Second Prize

-the very latest in portable video camera/recorder *(worth over £1300)* goes to Mr C. K. Duffy of 63 Cross Flats Place, Beeston, Leeds LS11 7JN.

Third Prize

-the ever popular BBC Model B Micro computer plus software package, awarded to Master P. W. Dawson of 11 Ladieside, Brae, Shetland ZE2 9SX.

And the winner of the

fourth prize

-a superb Minolta X700 camera with 50mm lens and flashgun is Mr Lee Sullivan of 3 Admers Wood, Vigo Village, Meopham, Kent DA13 0ST.

ASP would like to thank everyone who entered the competition, and CONGRATULATIONS to Mr Gouldthorp for his winning sentence which we've printed below

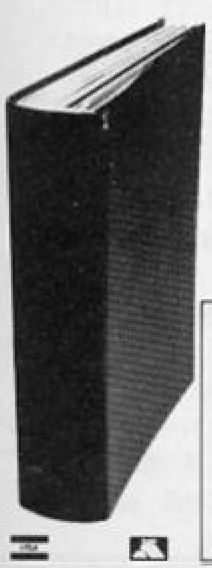
"...to combat boredom by the beach, keep magazines in easy reach!"

If an advertisement is wrong we're here to put it right.

If you see an advertisement in the press, in print, on posters or in the cinema which you find unacceptable, write to us at the address below.

The Advertising Standards Authority.

ASA Ltd, Dept 3 Brook House, Torrington Place, London WC1E 7HN



BINDERS

FOR YOUR VALUABLE COLLECTION OF Z.X. COMPUTING MAGAZINES

- SMART
- EASY TO USE
- TOP QUALITY

£5.20 inc P&P

To ASP Readers Service, PO Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts HP2 4SS (0442-41221)

Please supply ..... Z.X. Computing Binders £5.20 inc. P&P
Total £......(Please make cheques payable to ASP Ltd.)
Years Required - 198.., 198.., 198..,198..

Name...

Address...

Please allow 21 days for delivery

POOLS PREDICTION

Outputs, best draws, homes and aways.
Features analytical draw finder.
Prints team form comparison graphs.
Analyses and graphs results every week.
Takes full account of midweek games and "cup" matches between main league teams.
Promotion/relegation option. (Can be used from season to season).
Easy to use, even for beginners.
Gives paper printout of predictions if required.
Full back-up service.

48 WINS (309 DIVIDENDS) received by author so far.

"This is the best and most scientific of any program I have seen" - Mr R.A.P. (Secretary, Orpington Computer Club).

"Once again, thank you for one of the best investments I have made" -Mr D.L.B. (Feltham).

"I would like to congratulate you on your excellent service - it is a rare thing these days" - Mr L.G.P. (Shrewsbury)

"I found your program very professional and user friendly - I am very satisfied with it" - Mr B.D. (Spalding).

RACING PREDICTION

An easy to use predictor, by the same author, for the flat racing season.
No knowledge of racing required.
Input information from any daily newspaper.
Holds data on draw advantage and ground conditions for 37 British courses.
Self-teaching program is never out-of-date. Customers report wins of up to 33/1.

Ask for:		
	British Pools	£11.95
	Australian Pools	£11.95
	Flat Racing	£11.95

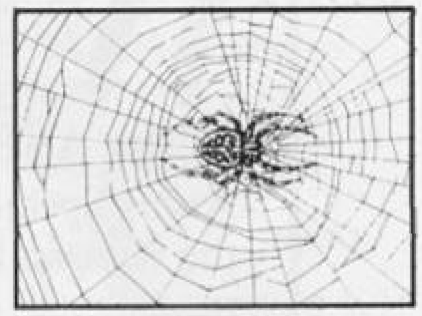
Allow 7 days for delivery. Cheques, P.O.'s payable to Rombest. Or quote Access/Eurocard/Mastercard number.

Overseas customers please add £1 for p&p

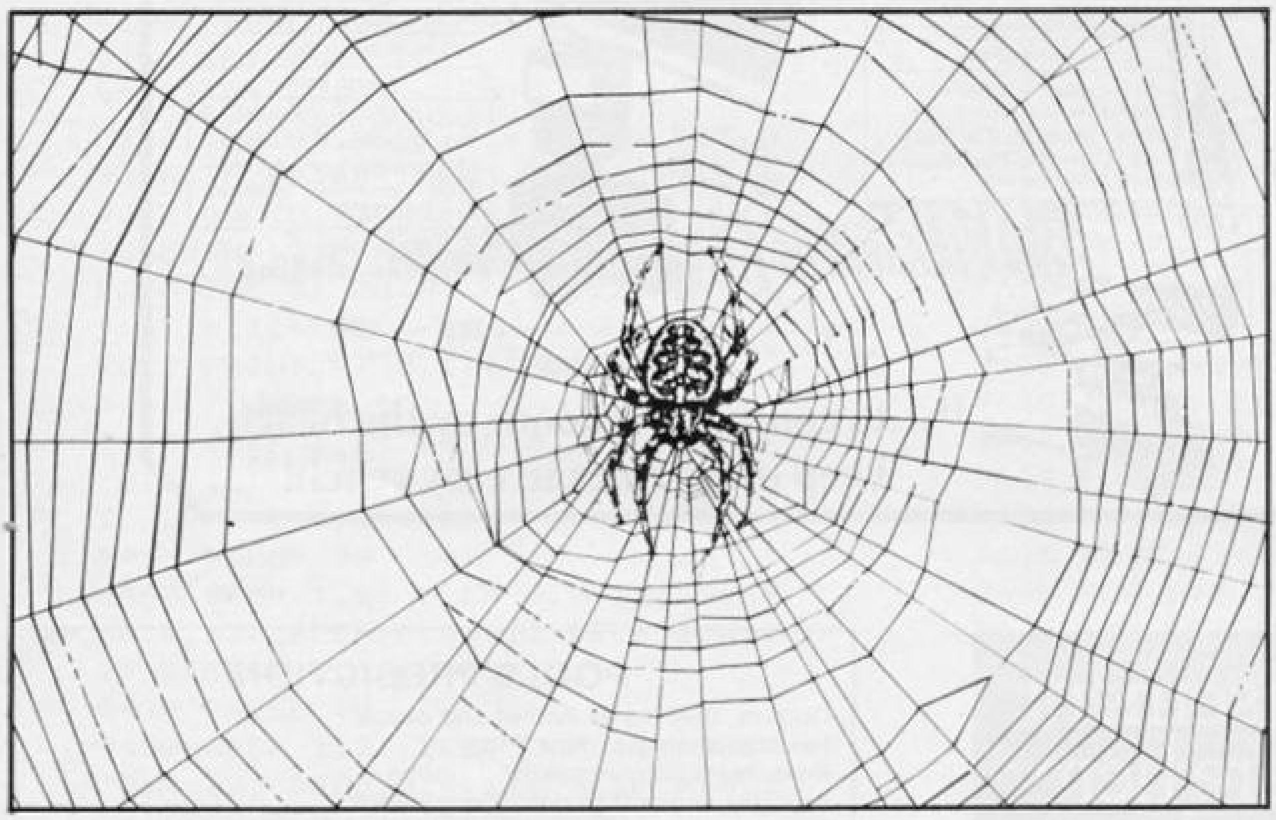
Rombest, Dept. ZX, 2, Welland Croft, Bicester, Oxon., OX6 8GD.

Available for 48 Spectrum British Pools also available for Commodore 64.

Spiders!



Keith Burton has a close encounter of the arachnid kind.



As caretaker of Spectrum Manor you have to keep the building clear of spiders and clear up those nasty creepy webs. There are three floors to patrol and some idiot has left three invisible mines on each floor! Fortunately, as you enter each floor the mines become visible for a few seconds so that you can make sure you avoid them. The spiders, being very light footed, do not trigger off the mines.

You have three lives to risk and cleaning up a piece of web scores one point. Dead spiders, the non-flashing kind, also score one point but live spiders score a generous twenty-five points. If you are one of the top five spider exterminators then you are rewarded with having your name held for posterity in the high score chart.

So, carefully positioning your fingers over the QZIP keys for UP, DOWN, LEFT and RIGHT do your bit for mankind in the battle against these horrid, harmless beasties.

But first you have to type it in. . . .

```
   1 REM ************************
         *Underlined characters*
         *are entered in        *
         *GRAPHICS mode.        *
         ************************
 100 REM ▀▀ SET UP VARIABLES ▀▀
▌
 110 DIM n$(45): DIM h(6)
 120 LET n$="zx      zx      zx      z
x    zx     "
 130 POKE 23658,0
 140 DIM m$(30,30)
 150 GO SUB 3210
 160 BORDER 1: PAPER 1: INK 7: C
LS
 200 REM ▀▀▀ GRAPHIC INTRO ▀▀▀
 210 LET a=1: LET b=30: LET c=1
 220 LET lf=3: LET hi=0
 230 FOR i=0 TO 21
 240 FOR z=a TO b STEP c
 250 IF c=1 THEN  PRINT AT i,z-1
; INK 2;"G": GO TO 270
 260 PRINT AT i,z+1; INK 6;"G"
 270 PRINT AT i,z;"H"
 280 BEEP .005,z
 290 NEXT z
 300 LET d=a: LET a=b: LET b=d:
IF c=1 THEN  LET c= 1: GO TO 320
 310 LET c=1
 320 NEXT i
 330 FOR i=1 TO 17 STEP 2: PRINT
 AT i,11; FLASH 1; PAPER 7; INK
2;" SPIDERS ": NEXT i
 340 FOR i=2 TO 16 STEP 2: PRINT
 AT i,11; FLASH 1; PAPER 2; INK
7;" SPIDERS ": NEXT i: PRINT AT
19,4;"  KEITH BURTON 1983   "
 350 PRINT AT 21,0; FLASH 1;"
  PRESS ANY KEY TO PLAY        ":
PAUSE 0: GO SUB 3400
 400 REM ▀▀▀ START OF GAME ▀▀▀
 410 LET sc=0
 420 LET lf=3
 430 LET l=1
 500 REM ▀▀▀ SET UP SCREEN ▀▀▀
 510 BORDER 0: PAPER 0: INK 6: C
```

```
LS
 515 IF l>3 OR l<1 THEN  LET l=1
 520 GO SUB 2010+3*l
 570 FOR i=1 TO 7: BORDER i: BEE
P .Ø1,i: BEEP .Ø1,2Ø-i: NEXT i:
BORDER Ø
 58Ø FOR i=Ø TO 19: PRINT AT i+1
,1;m$(i+1): NEXT i
 59Ø PRINT AT x,y;"E"
 6ØØ LET mx1=INT (RND*19)+1: LET
 mx2=INT (RND*19)+1: LET mx3=INT
 (RND*19)+1: LET my1=INT (RND*16
)+2: LET my2=INT (RND*16)+2: LET
 my3=INT (RND*16)+2
 61Ø IF m$(mx1,my1)=w$ THEN  GO
TO 6ØØ
 62Ø IF m$(mx2,my2)=w$ THEN  GO
TO 6ØØ
 63Ø IF m$(mx3,my3)=w$ THEN  GO
TO 6ØØ
 64Ø PRINT AT mx1,my1; FLASH 1;
INK 2;"I";AT mx2,my2;"I";AT mx3,
my3;"I": PAUSE 25: PRINT AT mx1,
my1;" ";AT mx2,my2;" ";AT mx3,my
3;" "
 65Ø PRINT AT 1Ø,Ø;"U";AT 11,Ø;"
P";AT 9,22;"D";AT 1Ø,22;"O";AT 1
1,22;"W";AT 12,22;"N"
 66Ø PRINT AT 2,25; INK 2; BRIGH
T 1;"SCORE";AT 6,25;"HIGH";AT 1Ø
,25;"LEVEL";AT 14,25;"LIVES"
 67Ø PRINT AT 4,25; BRIGHT 1; IN
K 6;sc;AT 8,25;h(1);AT 12,25;l;A
T 16,25;1f
 68Ø LET sx1=1Ø: LET sy1=13: LET
 sx2=14: LET sy2=15: PRINT AT sx
1,sy1; INK 5; BRIGHT 1;"H";AT sx
2,sy2; INK 2; BRIGHT 1;"H"
 7ØØ REM [redacted] MAIN LOOP [redacted]
 71Ø INK 7
 72Ø LET a$=INKEY$: BEEP .ØØ9,-1
Ø: IF a$="i" THEN  GO SUB 91Ø
 73Ø IF a$="p" THEN  GO SUB 98Ø
 74Ø IF a$="q" THEN  GO SUB 1Ø5Ø
 75Ø IF a$="z" THEN  GO SUB 112Ø
 76Ø IF x=11 AND (y=1 OR y=2Ø) T
HEN  GO TO 121Ø
 77Ø GO SUB 131Ø
 78Ø IF mx1=x AND my1=y THEN  GO
 SUB 17ØØ
 79Ø IF mx2=x AND my2=y THEN  GO
 SUB 17ØØ
 8ØØ IF mx3=x AND my3=y THEN  GO
 SUB 17ØØ
 81Ø PRINT AT 4,25; BRIGHT 1; IN
K 6;sc
 82Ø GO TO 72Ø
```

```
 9ØØ REM [redacted] MOVE YOU [redacted]
 91Ø IF m$(x,y-1)=w$ THEN  GO TO
 97Ø
 92Ø IF SCREEN$ (x,y-1)<>" " THE
N  LET sc=sc+1: BEEP .Ø1,1Ø
 93Ø IF y-1<1 THEN  RETURN
 94Ø PRINT AT x,y;" "
 95Ø LET y=y-1
 96Ø PRINT AT x,y;"E"
 97Ø RETURN
 98Ø IF m$(x,y+1)=w$ THEN  GO TO
 1Ø4Ø
 99Ø IF SCREEN$ (x,y+1)<>" " THE
N  LET sc=sc+1: BEEP .Ø1,1Ø
1ØØØ IF y+1>2Ø THEN  RETURN
1Ø1Ø PRINT AT x,y;" "
1Ø2Ø LET y=y+1
1Ø3Ø PRINT AT x,y;"E"
1Ø4Ø RETURN
1Ø5Ø IF m$(x-1,y)=w$ THEN  GO TO
 111Ø
1Ø6Ø IF SCREEN$ (x-1,y)<>" " THE
N  LET sc=sc+1: BEEP .Ø1,1Ø
1Ø7Ø IF x-1<1 THEN  RETURN
1Ø8Ø PRINT AT x,y;" "
1Ø9Ø LET x=x-1
11ØØ PRINT AT x,y;"E"
111Ø RETURN
112Ø IF m$(x+1,y)=w$ THEN  GO TO
 118Ø
113Ø IF SCREEN$ (x+1,y)<>" " THE
N  LET sc=sc+1: BEEP .Ø1,1Ø
114Ø IF x+1>19 THEN  RETURN
115Ø PRINT AT x,y;" "
116Ø LET x=x+1
117Ø PRINT AT x,y;"E"
118Ø RETURN
12ØØ REM [redacted] CHANGE LEVEL [redacted]
121Ø IF y=1 AND x=11 THEN  LET l
=l+1: IF l<=3 THEN  GO TO 51Ø
122Ø IF y=2Ø AND x=11 THEN  LET
l=l-1: IF l>=1 THEN  GO TO 51Ø
123Ø IF l>3 THEN  LET l=1: GO TO
 51Ø
124Ø IF l<1 THEN  LET l=3: GO TO
 51Ø
125Ø GO TO 121Ø
13ØØ  REM [redacted] MOVE SPIDERS [redacted]
131Ø PRINT AT sx1,sy1;"G"
132Ø PRINT AT sx2,sy2;"G"
133Ø IF m$(sx1+1,sy1)<>w$ AND sx
1>x THEN  LET sx1=sx1+1
134Ø IF m$(sx2+1,sy2)<>w$ AND sx
2>x THEN  LET sx2=sx2+1
135Ø IF m$(sx1-1,sy1)<>w$ AND sx
1<x THEN  LET sx1=sx1-1
136Ø IF m$(sx2-1,sy2)<>w$ AND sx
```

```
2<x THEN LET sx2=sx2-1
1370 IF m$(sx1,sy1+1)<>w$ AND sy
1>y THEN  LET sy1=sy1+1
1380 IF m$(sx2,sy2+1)<>w$ AND sy
2>y THEN  LET sy2=sy2+1
1390 IF m$(sx1,sy1-1)<>w$ AND sy
1<y THEN  LET sy1=sy1-1
1400 IF m$(sx2,sy2-1)<>w$ AND sy
2<y THEN  LET sy2=sy2-1
1410 IF sx1<1 THEN  LET sx1=1
1420 IF sx2<1 THEN  LET sx2=1
1430 IF sx1>19 THEN  LET sx1=19
1440 IF sx2>19 THEN  LET sx2=19
1450 IF sy2>19 THEN  LET sy2=19
1460 IF sy1>19 THEN  LET sy1=19
1470 IF sy1<2 THEN  LET sy1=2
1480 IF sy2<2 THEN  LET sy2=2
1490 PRINT AT sx1,sy1; INK 4;"H"
1500 PRINT AT sx2,sy2; INK 2;"H"
1510 IF (sx1=x AND sy1=y) OR (sx
2=x AND sy2=y) THEN  GO TO 1610
1520 RETURN
1600 REM ███ CAUGHT A SPIDER ███
1610 PRINT AT x,y; BRIGHT 1; FLA
SH 1; INK 4; PAPER 5;"H": LET sc
=sc+25: FOR n=10 TO -10 STEP -1:
 BEEP .01,n: NEXT n
1620 LET sx1=INT (RND*19)+2: LET
 sx2=INT (RND*19)+2
1630 LET sy1=INT (RND*16)+2: LET
 sy1=INT (RND*16)+2
1640 IF m$(sx1,sy1)=w$ THEN  GO
TO 1620
1650 IF m$(sx2,sy2)=w$ THEN  GO
TO 1620
1660 PRINT AT sx1,sy1; INK 4;"H"
1670 PRINT AT sx2,sy2; INK 2;"H"
1680 RETURN
1690 STOP
1700 REM ████ EXPLOSION ████
1710 OVER 1: FLASH 1: PRINT AT 0
,0; INK 2; PAPER 6,,,,,,,,,,,,,,
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,: FO
R n=60 TO -40 STEP -2: BEEP .008
,n: NEXT n: FLASH 0: OVER 0
1720 FOR i=1 TO 30: OUT 254,i: N
EXT i
1730 FOR p=-10 TO -30 STEP -2: B
EEP .1,p: NEXT p
1740 LET lf=lf-1
1750 IF lf<=0 THEN  GO TO 2000
1760 CLS
1770 FOR n=1 TO 5: FOR i=1 TO 7:
 INK i: BEEP .008,i-5: BEEP .008
,i-10
1780 PRINT AT 2,9;"█        ██
 █"
1790 PRINT AT 3,9;"█        ███
 █"
1800 PRINT AT 4,7;"████     ███
███"
1810 PRINT AT 5,9;"█      █████
 █"
1820 PRINT AT 6,9;"█
 █"
1830 PRINT AT 9,7;"███ ███ ███ █
█ ██ █"
1840 PRINT AT 10,7;"█ █ █ █ █ █
█ █ █ █"
1850 PRINT AT 11,7;"███ █ █ █ █
█  █ █"
1860 PRINT AT 12,7;"█ █ █ █ █ █
█  █"
1870 PRINT AT 13,7;"███ ███ ███
█  █ █"
1880 PRINT AT 17,7;"YOU STEPPED
ON A MINE!"
1890 PRINT AT 19,11;"LOSE A LIFE
"
1900 NEXT i
1910 NEXT n
1920 PRINT AT 20,10; FLASH 1;"CH
ANGE LEVEL"
1930 FOR i=50 TO -30 STEP -4: BE
EP .005,i: NEXT i
1940 LET l=l-1: IF l<1 THEN  LET
 l=l+2
1950 GO TO 510
2000 REM ██ HALL OF FAME ██
2010 IF sc>h(5) THEN  GO TO 2200
2020 CLS
2030 FOR i=1 TO 5: IF sc>h(i) TH
EN  FOR t=i TO 5: LET h(t+1)=h(t
): LET n$((((i+1)*6)-5) TO ((i+1
)*6))=n$(((i*6)-5) TO (i*6)): LE
T h(i)=sc: LET n$(((i*6)-5) TO (
i*6))=p$: LET i=5
2040 NEXT i
2050 FOR i=1 TO 20: PRINT AT i,4
; PAPER 4;"
 ": NEXT i
2060 FOR i=6 TO 15: PRINT AT i,7
; PAPER 1;"                 ": N
EXT i
2070 PRINT AT 5,7; PAPER 2;"
        "
2080 PRINT AT 1,12; FLASH 1;"SPI
DERS"
2090 FOR i=0 TO 7: INK i: PRINT
AT 3,9;"HALL OF FAME": BEEP .008
,i: NEXT i
2100 PAPER 1
2110 PRINT AT 5,9; PAPER 2;"NAME
      SCORE "
```

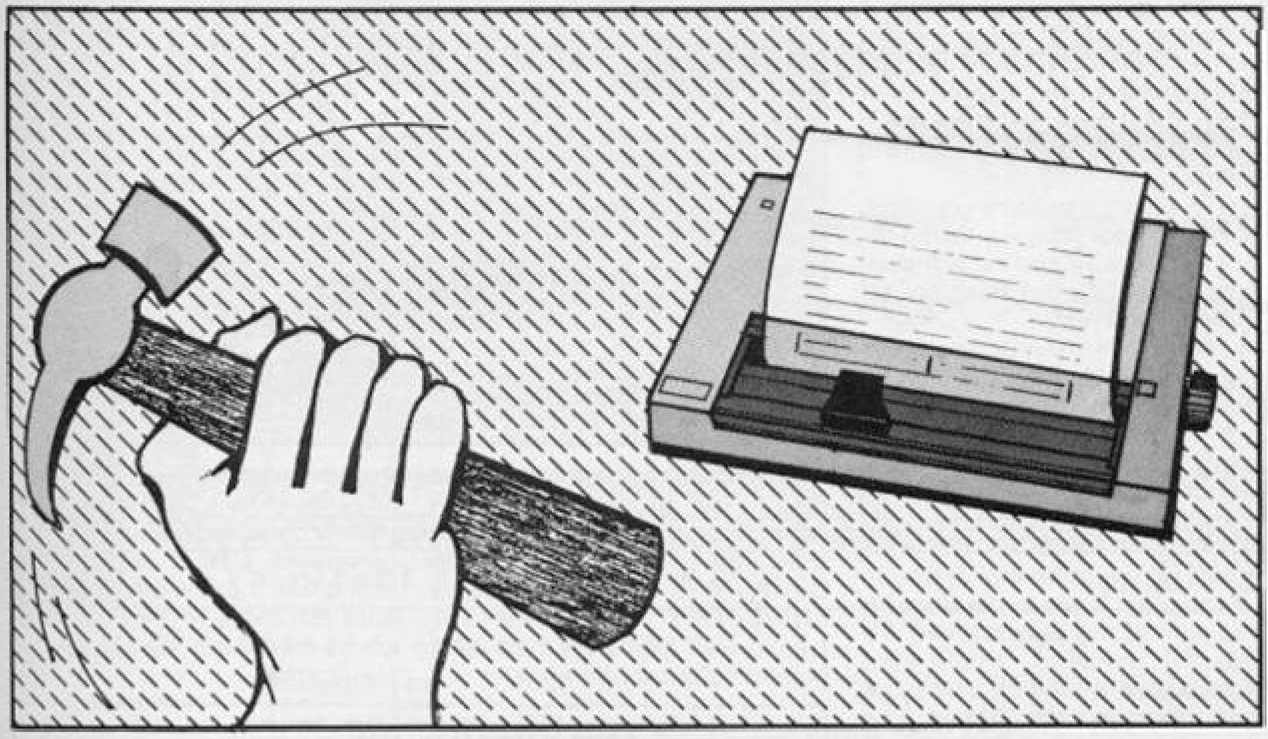
```
2120 FOR i=1 TO 5: PRINT AT i+6,7;i;AT i+6,9;n$(((i*6)-5) TO (i*6));AT i+6,18;h(i): NEXT i
2130 PRINT AT 13,8;"PRESS Q TO QUIT"
2140 PAPER 0
2150 PRINT AT 17,7;"PRESS C FOR COPY";AT 19,7;"PRESS P TO PLAY"
2160 PAUSE 0
2170 IF INKEY$="c" THEN  COPY : GO TO 2160
2180 IF INKEY$="q" THEN  STOP
2190 IF INKEY$="p" THEN  GO TO 410
2199 GO TO 2160
2200 REM ■ WELL DONE ENTER NAME■
2210 CLS
2220 FOR i=1 TO 4
2230 LET z$=" ▌▌▌▛▀▘▌ ▌ ▛▀▜▛ ▀▛▀▌▛▀ ▌▌   ▌▌▌▙▄ ▌ ▌ ▌ ▌▌ ▌▌▌▌▙▄ ▌▌   ▙▙▟▙▄▄▙▄▙▄▙▄▟▙ ▟▌▌▙▟▙▄ ▖▖"
2240 FOR a=0 TO 15 STEP 5: PRINT AT a,0; INK i+(a/5);z$
2250 NEXT a
2260 NEXT i
2270 FOR X=1 TO 25: FOR Y=20 TO 50 STEP 10: BEEP .008,Y: BEEP .01,Y-5: NEXT Y: NEXT X
2280 POKE 23658,8: INPUT "ENTER YOUR NAME";p$: IF LEN p$>6 THEN  LET p$=p$( TO 6)
2290 POKE 23658,0: GO TO 2020
2300 REM ▬▬ SET UP LEVEL 1 ▬▬
2310 LET m$(1)="EEEEEEEEEEEEEEEEEEEEE"
2320 LET m$(2)="E                   E"
2330 LET m$(3)="E EEEEEEE  EEEEEEE E"
2340 LET m$(4)="E E              E E"
2350 LET m$(5)="E E EEEEE  EEEEE E E"
2360 LET m$(6)="E E E          E E E"
2370 LET m$(7)="E E E          E E E"
2380 LET m$(8)="E E E EEEEEEEE E E E"
2390 LET m$(9)="E E E EEEEEEEE E E E"
2400 LET m$(10)="E E E      EE E E E"
2410 LET m$(11)="                   E"
2420 LET m$(12)="E E E  EEEEEE E E E"
2430 LET m$(13)="E E E  EEEEEE E E E"
2440 LET m$(14)="E E E         E E E"
2450 LET m$(15)="E E E         E E E"
2460 LET m$(16)="E E EEEEE  EEEE E E E"
2470 LET m$(17)="E E             E E"
2480 LET m$(18)="E EEEEEEE  EEEEEEE E"
2490 LET m$(19)="E                  E"
2500 LET m$(20)="EEEEEEEEEEEEEEEEEEEEE"
2510 LET x=11: LET y=2: PRINT AT x,y;"E"
2520 LET w$="E": RETURN
2600 REM ▬▬ SET UP LEVEL 2 ▬▬
2610 LET m$(1)="▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚"
2620 LET m$(2)="▚     ▚▚▚▚ ▚▚▚▚     ▚"
2630 LET m$(3)="▚                  ▚"
2640 LET m$(4)="▚ ▚    ▚▚▚▚▚▚    ▚ ▚"
2650 LET m$(5)="▚ ▚ ▚          ▚ ▚ ▚"
2660 LET m$(6)="▚    ▚ ▚    ▚ ▚    ▚"
2670 LET m$(7)="▚      ▚ ▚▚▚▚ ▚      ▚"
2680 LET m$(8)="▚ ▚    ▚ ▚    ▚ ▚"
2690 LET m$(9)="▚ ▚ ▚         ▚ ▚ ▚"
2700 LET m$(10)="▚ ▚ ▚ ▚     ▚ ▚ ▚ ▚"
2710 LET m$(11)="  ▚ ▚ ▚     ▚ ▚ ▚  "
2720 LET m$(12)="▚ ▚ ▚         ▚ ▚ ▚"
2730 LET m$(13)="▚ ▚    ▚ ▚    ▚ ▚"
2740 LET m$(14)="▚      ▚ ▚▚▚▚ ▚      ▚"
2750 LET m$(15)="▚    ▚ ▚    ▚ ▚    ▚"
2760 LET m$(16)="▚ ▚ ▚          ▚ ▚ ▚"
2770 LET m$(17)="▚ ▚    ▚▚▚▚▚▚    ▚ ▚"
2780 LET m$(18)="▚                  ▚"
```

```
2790 LET m$(19)="▖      ▚▚▚▚  ▚▚▚▚
 ▚▘"
2800 LET m$(20)="▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚
▚▚▚▚"
2810 LET x=11: LET y=2: PRINT AT
 x,y;"E"
2820 LET w$="▚": RETURN
2900 REM ■■■ SET UP LEVEL 3 ■■■
2910 LET m$(1)="0000000000000000
0000"
2920 LET m$(2)="O 0 00
  O"
2930 LET m$(3)="O 0   0 000000000
 0 O"
2940 LET m$(4)="O
  O"
2950 LET m$(5)="O 0000000 0 000
00 O"
2960 LET m$(6)="O          0   0
  O"
2970 LET m$(7)="O 000 00 0    0 0
000"
2980 LET m$(8)="O 0 0 00    0    0
  O"
2990 LET m$(9)="O 0 0     0 0 0
 0 O"
3000 LET m$(10)="O 0         0 0 0
0  00"
3010 LET m$(11)="O 0 000   0    0
0 0  "
3020 LET m$(12)="O              0    0
   O"
3030 LET m$(13)="00000 00 0 0 00
000 O"
3040 LET m$(14)="O               0
   O"
3050 LET m$(15)="O 000 0000 0000
00 00"
3060 LET m$(16)="O  00    00    0
   O"
3070 LET m$(17)="O 00  0  0 0
0    O"
3080 LET m$(18)="O 0  000   00000
000 O"
3090 LET m$(19)="O     00000
   O"
3100 LET x=11: LET y=2: PRINT AT
 x,y;"E"
3110 LET m$(20)="000000000000000
00000"
3120 LET w$="O": RETURN
3200 REM ■■■ SET UP UDG ■■■
3210 RESTORE 3290
3220 FOR t=1 TO 5
3230 READ a$
3240 FOR i=0 TO 7
3250 READ a
```

```
3260 POKE USR a$+i,a
3270 NEXT i
3280 NEXT t
3290 DATA "e",56,16,124,186,56,5
6,68,68
3300 DATA "f",255,195,189,173,18
1,189,195,255
3310 DATA "g",0,0,119,34,255,34,
119,0
3320 DATA "h",0,0,24,60,66,90,16
5,165
3330 DATA "i",0,0,24,60,60,126,0
,0
3340 RETURN
3400 REM ■■■ INSTRUCTIONS ■■■
3410 LET z$="You are the caretak
er of an old house. The house ha
s three        levels you may move
 up and down the levels when eve
r you wish bygoing to the stairw
ays on each  level. You job is t
o find and   kill any spiders yo
u can see    The spiders are alw
ays spinning webs which you must
 also clean  up.
              BEWARE on each lev
el three     mines have been pla
nted they    won't harm the spid
ers but they will kill you.
              You will be given a
 quick look  at where the mines
are each timeyou change levels."
3420 BORDER 1: PAPER 1: INK 6: C
LS
3430 PRINT AT 1,11; FLASH 1; PAP
ER 2;"SPIDERS"
3440 PRINT AT 2,0
3450 FOR i=1 TO LEN z$: IF z$(i)
=" " THEN  PRINT " ";: NEXT i
3455 PRINT z$(i);: BEEP .009,10:
 NEXT i
3460 PRINT AT 21,4;"PRESS ANY KE
Y": PAUSE 0: BEEP 1,0
3470 CLS : PRINT AT 0,10; FLASH
1;"INSTRUCTIONS";AT 2,2; FLASH 0
;"I left";AT 4,2;"P right";AT 6,
2;"Q up";AT 8,2;"Z down";AT 10,2
;"E You";AT 12,2;"G  1 point";AT
 14,2;"H  25 points";AT 16,2;"I
mine - lose a life";AT 20,2;"PRE
SS ANY KEY WHEN READY": PAUSE 0
3480 RETURN
9900 REM PROGRAM LENGTH 12.9
K▄▄ ▄▄▄ ▄:144~
 SAVE "SPIDERS" LINE 1: VERIFY "
SPIDERS": STOP
9999 REM 290 5000 10 490
```

Printer Ploys

Charles A Barron gets to grips with using his printer.



So Uncle Clive has killed off the ZX Printer — one of the most useful and impressive little toys he ever gave us. But then he gave us Interface I and who can resist plugging in a real live full-width printer to its little RS232 port?

But now that we all have a real printer, can we make best use of it? The first essential is some software to make the thing work properly — something like *Tasword 2*, perhaps, which will format our print-outs with neatly justified right-hand margins. But that's just a start. Do your documents involve typing the same name or formula over and over again? Well, if your software allows you to seek and replace a word, you can save yourself a great deal of finger-tapping. For example, I spend most of my hours at my Spectrum pretending it's a word-processor in order to write plays. Now the one thing you can be sure of in writing a play is that you are going to have a lot of repetitive typing: every time a character speaks you need his name in full. A page of quick-fire dialogue may use a character's name 20 or 30 times, especially when you consider that you not only begin every speech with the speaker's name, you also have the characters constantly addressing each other by name: You've seen the kind of thing:

MURGATROYD: Daphne!
DAPHNE: Murgatroyd! It's you!
MURGATROYD: As you say Daphne, it is I.
DAPHNE: At last, Murgatroyd.

Four *Murgatroyds* and four *Daphnes* in just four lines of deathless dialogue. Most writers cheat, when writing their draft versions of the text, and use abbreviations for the names. Ever noticed how characters' names always begin with different letters of the alphabet? That way we can just use the initial letter for identification in the early scripts. (We're way ahead of one William Shakespeare here; Macbeth, Malcolm, Macduff — all in one play. He must have been fonder of quill-scratching than I am of keyboard-tapping.)

Once the rough draft has been cleaned up and polished, you just have to use the *find-and-replace* function to find all your character-identification initials and replace them with the names in full. So, the draft looks like this:

M: D!
D: M! It's you!
M: As you say, D. It is I.
D: At last, M.

And the filled out version looks like the quotation above. A saving of 56 key-taps in four lines!

Once the play, or whatever, is complete, you'll want to give it a finished look. Page numbers. Maybe even page headers? (That is where the title of the piece appears at the top of every page.) An unconscionable amount of typing for just a little fancy decoration. And none of the software packages for the Spectrum that I've come across allows automatic page numbering. That is the only really desirable function of those £5000 word processors that is missing on Uncle Clive's little wonder. (Though by the time you've added Interface and the printer and a couple of microdrive cartridges to store your prose on, it is beginning to cost about as much as the £5000 job!).

Here is a little program that will give you automatic page numbering and automatic page headers at the cost of typing it not only once. It will only work if your printer/interface/software combination allows you to program in a form feed instruction: that moves the paper through the printer one full fanfold. You should also set them to give you automatic skip over the perforations, if that is possible.

Run off your document, keeping the perforations intact; tear off the last sheet and then feed in page one again, setting the top of the page carefully to where you would want the page header to come. Set the program running and the printer will run your printed play or White Paper through again, pausing only once every page to add the titles and page numbers.

In the program listing, which should work for the common types of dot matrix printers, you will have to set the baud rate to suit your own set-up, and put enough spaces into your title in line 20 to bring it to the desired position on the page. If your printer can be programmed with TAB settings, then you can use these instead of the row of spaces. The program begins by asking you how many pages your opus runs to. If you are too tired after composing the thing to face counting them, you can always lie to your computer and pretend to have written 2000 pages — it will give up the program of its own accord when it runs out of paper. (But it may never trust you to tell the truth again!).

CHR$ 12 is simply the Form Feed control code; your machine may need a different code, though that is unlikely. Refer, as they say, to the manual and adjust the program accordingly. 'As The Bat At Noon' is what we call in the trade a variable; please don't name all your documents after my play.

PROGRAM LISTING

```
3     "No of pages?";n
5     FORMAT "b";4800: OPEN #3;"b"
10    FOR a = 1 TO n
20    LPRINT "     As The Bat At Noon      ";a
30    LPRINT CHR$ 12
40    NEXT a
50    CLOSE #3
```

Goblin Dungeon

In this frustrating, amazing chase game, Peter Watson mixes planning with action — you'll need a good head to go down to the depths and back!

The object of the game is to retrieve all the treasure from the dungeon without being caught by the goblins. Treasure must be collected in order, beginning at the highest level, and then taken back to the green door safe keeping.

To collect a treasure you simply move your man up to the required treasure and he will then automatically start flashing, indicating pick-up.

You have three lives, but if caught by a goblin whilst in possession of a treasure, you are immediately killed and the game ends. A treasure that is not due for collection will block the path of your man. This is not a problem since he has five sticks of dynamite which he can use to blast holes in the floor (or ceiling if at the lowest level). To use the dynamite, move your man adjacent to such a treasure and then press the 'O' key. The floor (or ceiling) will flash red leaving a hole for your man to pass through.

Instructions and control details ie cursor keys for left, right, up and down, and 0 to use dynamite, are given at the beginning of the game. Your status is given during the game ie treasure collected, number of sticks of dynamite and lives left.

To win the game you need to use all the dynamite and entice the goblins away from the area of the green door in order to give your man time to get the treasures back....(unfortunately the goblins are rather quick witted!).

The game will not fit a 16K Spectrum in its complete form. However if the title, instructions and control details (lines 7000-7210 inclusive) are deleted it should fit. Line 30 should be changed to: GOSUB 9000 : CLS

Program details

The program consists of a main game loop with calls to various sub-routines. Extensive use is made of the ATTRibute command and so any changes of colour on the playing area of the screen should be made with care.



The goblin co-ordinates are held in two arrays, each goblin being moved once each cycle of the 'goblin move' loop. Fifteen User Defined Graphics characters are used for treasures, goblins, man and screen construction etc.

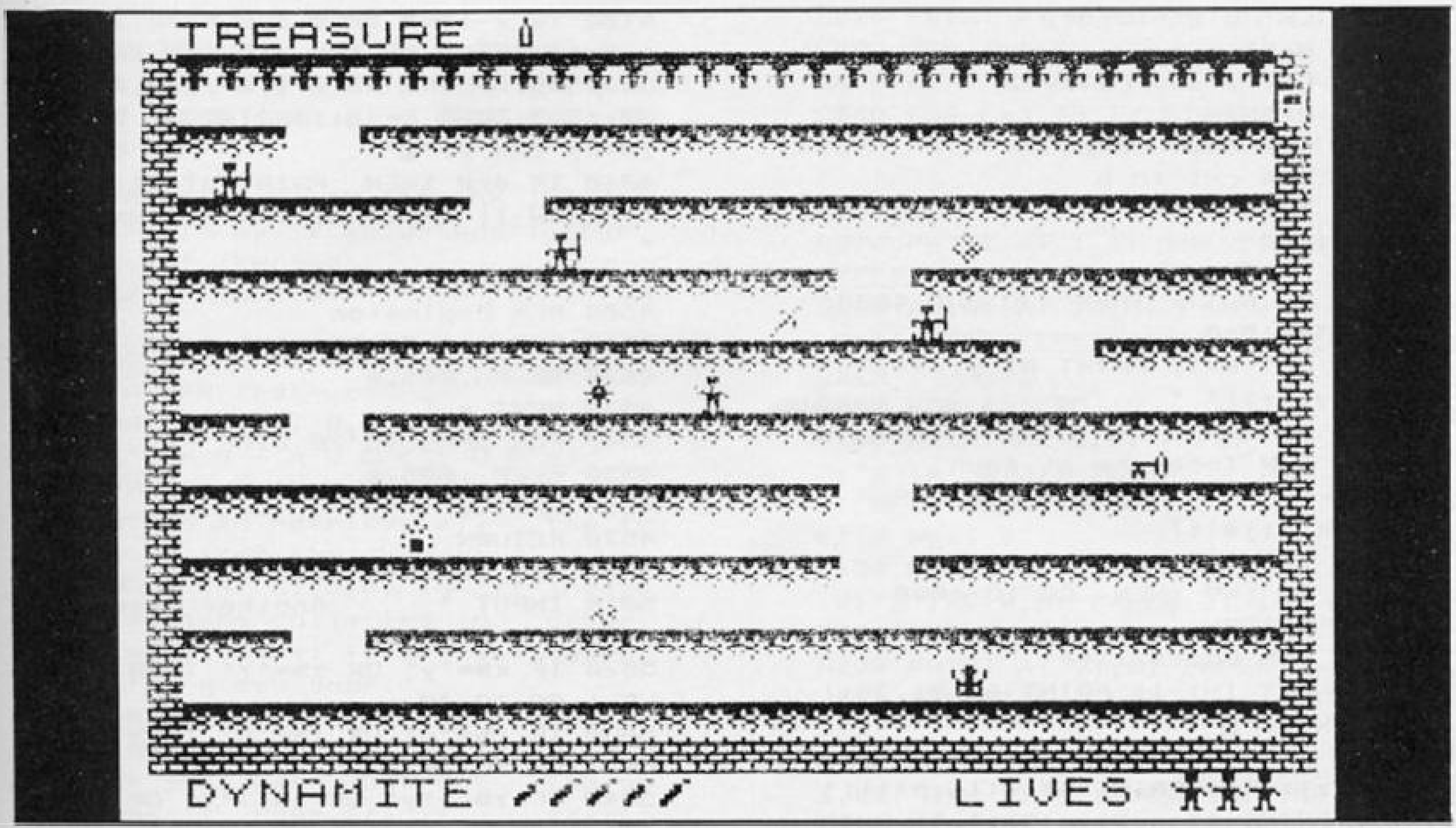
When the program listing has all been entered and checked it should be saved using the direct command GOTO 9990. The listing will then be SAVEd in the auto-run mode followed by a request to rewind tape ready for verification.

Listing details

10-80	Initialisation
100-310	Main game loop
900-960	Variables
1000-1060	Take treasure
2000-2040	Treasure at door
3000-3040	Loose life
3500-3540	Sound
4000-4070	Use dynamite
4500-4570	Explosion
5000-5050	Another game
6000-6060	Win game
7000-7060	Game title
7070-7140	Instructions
7150-7210	Game controls
8000-8150	Screen
9000-9060	UDG's
9990-9993	Save and verify

Graphic details

Line 80	Graphic G,H,I,J,K,L,M,N
Line 180	Graphic C
Line 270	Graphic 8 (x3)
Line 280	Graphic D
Line 3010,3030,4060	Graphic 8
Line 4020,4030,4040 4050,8020	Graphics AA
Line 7170	Inverse Video 5,6,7,8,0
Line 7180	Graphic C
Line 8070	Graphic F (x30)
Lini 8080	Graphic E (x32)
Line 8100	Graphic E
Line 8120	Graphic B
Line 8130	Graphic 0 (x5), Graphic C (x3)
Line 8140	Graphic G,H,I,J,K,L,M,N

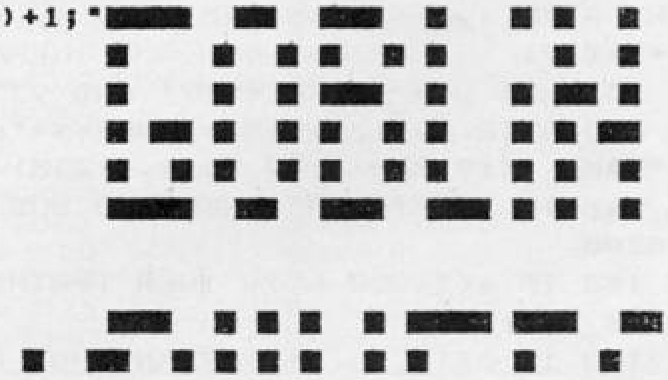



```
   1 REM ***********************
         *Underlined characters*
         *are entered in       *
         *GRAPHICS mode.       *
         ***********************

  10 PAPER 0: BORDER 0: INK 3: C
LS
  20 PRINT AT 11,5; PAPER 1; INK
 7; FLASH 1;" Please wait a mome
nt "
  30 GO SUB 9000: GO SUB 7000
  40 DIM p(3): DIM q(3)
  60 GO SUB 8000: GO SUB 900
  70 LET d=5: LET k=0: LET l=3:
LET t=1
  80 LET j$="GHIJKLMN"
 100 REM Move man & goblins
 110 LET a=x: LET b=y
 120 LET x=x-(INKEY$="5" AND x>1
 AND ATTR (y,x-1)<>5 AND ATTR (y
,x-1)<>7)+(INKEY$="8" AND x<30 A
ND ATTR (y,x+1)<>5 AND ATTR (y,x
+1)<>7)
 130 LET y=y-(INKEY$="7" AND y>1
 AND ATTR (y-1,x)<>5)+(INKEY$="6
" AND y<19 AND ATTR (y+1,x)<>5)
 140 IF INKEY$="0" THEN GO SUB
4000
 150 IF a<>x OR b<>y THEN PRINT
 AT b,a;" "
 160 IF ATTR (y,x+1)=7 AND NOT k
 OR ATTR (y,x-1)=7 AND NOT k THE
N BEEP .1,30: GO SUB 1000
 170 IF ATTR (y,x+1)=32 AND k TH
EN GO SUB 3500: GO SUB 2000
 180 PRINT AT y,x; FLASH k; INK
6;"C": BEEP .005,50
 190 FOR z=1 TO 3
 200 PRINT AT q(z),p(z);" "
 210 LET p(z)=p(z)+1
 220 IF ATTR (q(z),p(z))=7 THEN
 LET p(z)=p(z)+1
 230 IF q(z)>y AND ATTR (q(z)-1,
p(z))<>5 THEN LET q(z)=q(z)-1
 240 IF q(z)<y AND ATTR (q(z)+1,
p(z))<>5 THEN LET q(z)=q(z)+1
 250 IF ATTR (q(z),p(z))=4 THEN
 LET p(z)=-p(z)
 260 IF ATTR (q(z),p(z))=6 THEN
 GO SUB 3500: GO SUB 3000: GO TO
 110
 270 IF ATTR (q(z),p(z))=134 THE
N GO SUB 3500: PRINT AT 21,28;
INK 2;"███": GO SUB 5000
 280 PRINT AT q(z),p(z); INK 4;"
D"
 290 IF p(z)=-1 OR p(z)=30 THEN
 LET p(z)=-p(z)
 300 NEXT z
 310 GO TO 110
 900 REM Variables
 910 FOR q=1 TO 3
 920 LET p(q)=1
```

```
930 LET q(q)=12+q*2
940 NEXT q
950 LET x=3Ø: LET y=2
960 RETURN
1ØØØ REM Take treasure
1Ø1Ø FOR c=1 TO 8
1Ø2Ø IF t=c AND y=2+2*c THEN  GO
 TO 1Ø5Ø
1Ø3Ø NEXT c
1Ø4Ø IF NOT k THEN  GO SUB 4ØØØ:
 GO TO 1Ø6Ø
1Ø5Ø LET k=1: PRINT AT y,x-1;" "
;AT y,x+1;" "
1Ø6Ø RETURN
2ØØØ REM Treasure at door
2Ø1Ø PRINT AT Ø,8+(t*2); PAPER 2
; INK 6;j$(t)
2Ø2Ø LET k=Ø: LET t=t+1
2Ø3Ø IF t=9 THEN  GO TO 6ØØØ
2Ø4Ø RETURN
3ØØØ REM Loose life
3Ø1Ø LET l=l-1: PRINT AT 21,28+l
; INK 2;"■"
3Ø2Ø IF NOT k THEN  PRINT AT q(z
),p(z);" ": PRINT AT q(1),p(1);"
 ": PRINT AT q(2),p(2);" ": PRIN
T AT q(3),p(3);" ": GO SUB 9ØØ
3Ø3Ø IF l=Ø THEN  PRINT AT 21,29
; INK 2;"■": GO SUB 35ØØ: GO TO
5ØØØ
3Ø4Ø RETURN
35ØØ REM Sound
351Ø FOR s=5Ø TO Ø STEP -2
352Ø BEEP .Ø1,s
353Ø NEXT s
354Ø RETURN
4ØØØ REM Use dynamite
4Ø1Ø IF INKEY$<>"Ø" OR d=Ø THEN
 GO TO 4Ø7Ø
4Ø2Ø IF INKEY$="Ø" AND y<>18 AND
 ATTR (y,x+1)=7 THEN  PRINT AT y
+1,x-2; FLASH 1; INK 2;"AA": GO
SUB 45ØØ: PRINT AT y+1,x-2; FLAS
H Ø;"  ": LET d=d-1: PRINT AT 21
,1Ø+d; INK 2;"■"
4Ø3Ø IF INKEY$="Ø" AND y<>18 AND
 ATTR (y,x-1)=7 THEN  PRINT AT y
+1,x+1; FLASH 1; INK 2;"AA": GO
SUB 45ØØ: PRINT AT y+1,x+1; FLAS
H Ø;"  ": LET d=d-1: PRINT AT 21
,1Ø+d; INK 2;"■"
4Ø4Ø IF INKEY$="Ø" AND y=18 AND
ATTR (y,x+1)=7 THEN  PRINT AT y-
1,x-2; FLASH 1; INK 2;"AA": GO S
UB 45ØØ: PRINT AT y-1,x-2; FLASH
 Ø;"  ": LET d=d-1: PRINT AT 21,
1Ø+d; INK 2;"■"
4Ø5Ø IF INKEY$="Ø" AND y=18 AND
ATTR (y,x-1)=7 THEN  PRINT AT y-
1,x+1; FLASH 1; INK 2;"AA": GO S
UB 45ØØ: PRINT AT y-1,x+1; FLASH
 Ø;"  ": LET d=d-1: PRINT AT 21,
1Ø+d; INK 2;"■"
4Ø6Ø IF d=Ø THEN  PRINT AT 21,1Ø
; FLASH 1; PAPER 2; INK 6;"GONE!
"
4Ø7Ø RETURN
45ØØ REM Explosion
451Ø FOR e=Ø TO 5Ø STEP 6
452Ø BEEP .ØØ5,e
453Ø NEXT e
454Ø FOR e=5Ø TO 2Ø STEP -1
455Ø BEEP .ØØ5,e
456Ø NEXT e
457Ø RETURN
5ØØØ REM Another Game?
5Ø1Ø INPUT "        Another Game?
(y/n) "; LINE z$
5Ø2Ø IF z$="y" OR z$="Y" THEN  C
LS : GO TO 4Ø
5Ø3Ø IF z$="n" OR z$="N" THEN  C
LS : GO TO 5Ø5Ø
5Ø4Ø IF z$<>"y" OR z$<>"Y" OR z$
<>"n" OR z$<>"N" THEN  GO TO 5Ø1
Ø
5Ø5Ø PRINT '' INK RND*6; BRIGHT
1;TAB RND*15;"OK, BYE FOR NOW!":
 POKE 23692,255: GO TO 5Ø5Ø
6ØØØ REM Win game
6Ø1Ø CLS
6Ø2Ø PRINT AT 1Ø,1Ø; BRIGHT 1; I
NK INT (RND*6)+1;"WELL  DONE ''

        You have all the trea
sure"
6Ø3Ø LET w=INT (RND*5Ø)
6Ø4Ø BEEP .Ø1,w
6Ø5Ø IF INKEY$="" THEN  GO TO 6Ø
2Ø
6Ø6Ø STOP
7ØØØ REM Game title
7Ø1Ø PAPER Ø: BORDER Ø: CLS
7Ø2Ø PRINT #Ø;AT 1,Ø; INK 7;" Pr
ess any key for instructions",
7Ø3Ø PRINT AT 3,Ø; INK INT (RND*
6)+1;"
```



```
█ █  ██  █ █ █ ██ █ █    █   █
█ ██ ██  █ █ █ █ ██ █ ██ ██  █
█ █ ███  █ █ █ █  █ █  █ █   █
█ █  ████   █  █  █ ████ ███  ██
  █  █"
7040 PRINT AT 19,16; INK INT (RN
D*6)+1;" by Peter Watson": BEEP
.01,INT (RND*50)
7050 IF INKEY$="" THEN  GO TO 70
30
7060 PAUSE 0: BEEP .1,30: CLS
7070 REM Instructions"
7080 PRINT AT 0,4; INK 4; BRIGHT
 1;"I N S T R U C T I O N S"
7090 PRINT AT 2,0; INK 7;"Your q
uest is to retrieve all   the tr
easure from the dungeon."
7100 PRINT AT 5,0; INK 7;"Treasu
re must be collected in   order
(highest level first) and taken
to the green door."
7110 PRINT AT 9,0; INK 7;"Any it
em not due for collection will b
lock your path (but not   the go
blins!!). However, if     adjace
nt to such a treasure, youcan us
e your dynamite to blast  holes
in the floor (or ceiling  if on
the bottom level)."
7120 PRINT AT 17,0; INK 7;"You h
ave three lives - but if   caugh
t by a goblin whilst in    posse
sion of treasure it's      insta
nt death!!"
7130 PRINT #0;AT 1,0; PAPER 6; I
NK 2; FLASH 1;"  Press any key f
or controls...  "
7140 PAUSE 0: BEEP .1,30: CLS
7150 REM Game controls
7160 PRINT AT 3,8; INK 4; BRIGHT
 1;"C O N T R O L S"
7170 PRINT AT 7,1; INK 7;"5
6      7      8      0



                          left  d
own   up   right   dynamite"
7180 PRINT AT 13,6; FLASH 1; INK
 6;"C";AT 13,8; FLASH 0; INK 7;"
treasure collected"
7190 PRINT AT 21,3; PAPER 2; INK
 6; FLASH 1;" Press any key to p
lay... "
7200 PAUSE 0: CLS : BEEP .1,30
7210 RETURN
8000 REM Screen construction
8010 FOR a=1 TO 30 STEP 2: FOR b
=3 TO 19 STEP 2
8020 PRINT AT b,a; INK 5;"AA": B
EEP .005,(b+a)
8030 NEXT b: NEXT a
8040 FOR c=3 TO 17 STEP 2
8050 PRINT AT c,4+INT (RND*5)*5;
"  "
8060 NEXT c
8070 PRINT AT 1,1; INK 5;"FFFFFF
FFFFFFFFFFFFFFFFFFFFFFFF"
8080 PRINT AT 20,0; PAPER 7; INK
 3;"EEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEE"
8090 FOR d=1 TO 19
8100 PRINT AT d,0; PAPER 7; INK
3;"E";AT d,31; PAPER 7; INK 3;"E
": BEEP .005,(50-d)
8110 NEXT d
8120 PRINT AT 2,31; PAPER 4; INK
 0;"B";AT 0,0; PAPER 2; INK 6;"
TREASURE                        "
8130 PRINT AT 21,0; PAPER 2; INK
 6;" DYNAMITE OOOOO        LIVES
CCC "
8140 PRINT AT 4,7; INK 7;"G";AT
6,22; INK 7;"H";AT 8,17; INK 7;"
I";AT 10,12; INK 7;"J";AT 12,27;
 INK 7;"K";AT 14,7; INK 7;"L";AT
 16,12; INK 7;"M";AT 18,22; INK
7;"N"
8150 RETURN
9000 REM Graphics
9010 FOR n=1 TO 15: READ a$
9020 FOR p=0 TO 7: READ q: POKE
USR a$+p,q
9030 NEXT p: NEXT n
9040 DATA "A",255,255,219,228,25
,164,8,0,"B",255,129,189,189,129
,161,129,129,"C",28,28,136,126,2
9,28,20,54,"D",57,57,17,255,185,
57,170,238,"E",34,255,136,255,34
,255,136,255,"F",255,255,255,60,
24,126,90,24
9050 DATA "G",8,8,20,20,20,20,28
,0,"H",8,20,42,69,42,20,8,0,"I",
1,26,4,10,18,32,64,0,"J",16,84,5
6,254,56,84,16,0,"K",0,2,5,253,6
9,229,162,0,"L",16,68,40,130,56,
186,56,0,"M",0,16,4,18,36,82,8,0
,"N",24,189,153,90,126,90,126,0,
"O",0,6,24,56,112,224,192,0
9060 RETURN
9990 CLS : SAVE "goblin" LINE 1
9991 PRINT AT 10,0; INK 7;"Re-wi
nd tape then run to VERIFY."
9992 VERIFY "goblin"
9993 PRINT AT 10,0; INK 7;"
    Tape Verified.          ": ST
OP
```

■

Light Screen Designer

Part 10: by Toni Baker



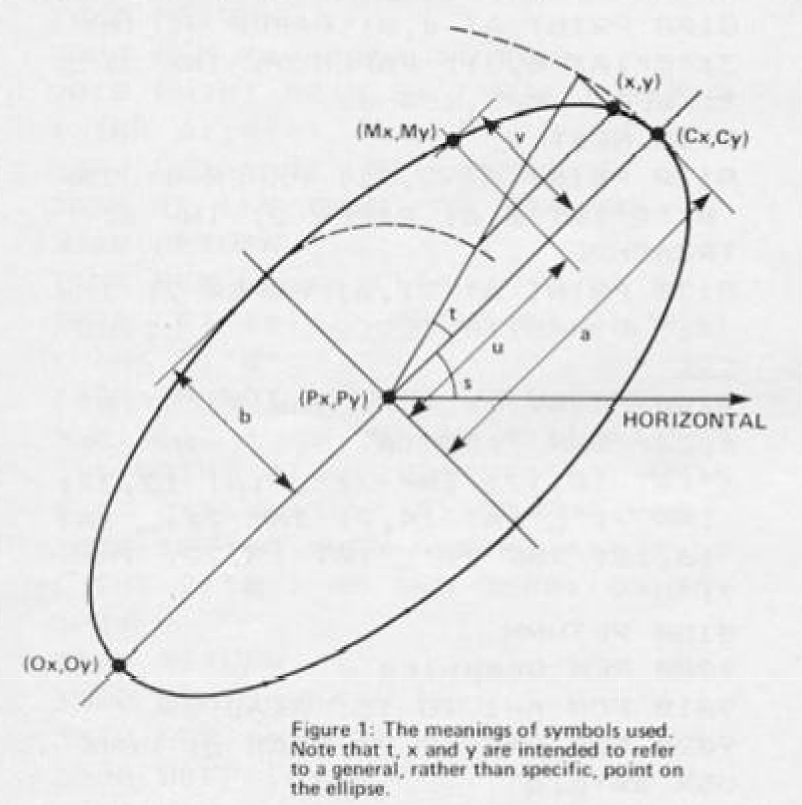


Figure 1: The meanings of symbols used. Note that t, x and y are intended to refer to a general, rather than specific, point on the ellipse.

In this, the penultimate part of the Light Screen Designer program, I shall be covering ellipses. The program has two ellipse procedures; ELLIPSE and QUARTER ELLIPSE. First though, I'd like to talk about last issue's article. One bug cropped up, which was that if the cursor was set to print in italics, and cursor left was repeatedly pressed, strange things would happen at the left hand edge of the screen. The bug occurred at address E45E, where the byte readng 20 should have read 32.

The other error I made — a rather silly one — was that I forgot to actually link the procedure into the rest of the program! This is of course simple to do — you just store the address of the start of the procedure in the command addresses table. The alterations in figure 3 will therefore (a) cure the bug, (b) link in the text proceedure, and (c) link in this edition's ellipse proceedures as well (well, we might as well while we're at it).

Ellipses

Anyway — ellipses. This is rather different from all the other line or curve drawing routines we've covered so far because it doesn't make any use of a ready made ROM routine. It can't, because there isn't one. When we covered circles and arcs we were able to make use of the ROM's CIRCLE or DRAW_ARC routines, but the Spectrum was never designed to draw ellipses. This is something we have to arrange all by ourselves.

The program makes extensive use of the calculator memories — in fact it needs sixteen of them. If you refer to the diagram in figure one, and compare it to the chart below (figure 4), you'll see exactly how these memories are used:

If you don't understand any of the terms in the list you should be able to suss it all out by looking at the diagram. Onto the program . . .

The first subroutine is called ELL_SUB. This subroutine calculates the coordinates (x,y) of a point on the ellipse. For each different angle, t, a different point on the ellipse will be calculated. The resulting coordinates will be left on the top of the calculator stack.

The next subroutine is called ELL_Q. This is the routine which actually draws the ellipse. The first thing the routine does is to calculate N, which is the number of points around the ellipse needed to give a smooth looking curve. (Actually the number is 4*N, since N is the number of points needed for a quarter ellipse). Then it calculates i, the angle needed to ensure that 4*N points are plotted evenly around the ellipse. NB is transferred into the BC register pair, and i is stored in memory three. Note that the routine will only work if memories M4 to MF are first assigned as above. Anyway, the subroutine then proceeds to draw the curve by running into the subroutine CURVE.

CURVE is the subroutine which draws a curve. It is completely general and will in fact draw any curve whatsoever, be it an ellipse, a spirograph pattern, or a superior epitrochoid! It requires three things:

(1) That BC contains the number of line segments to be

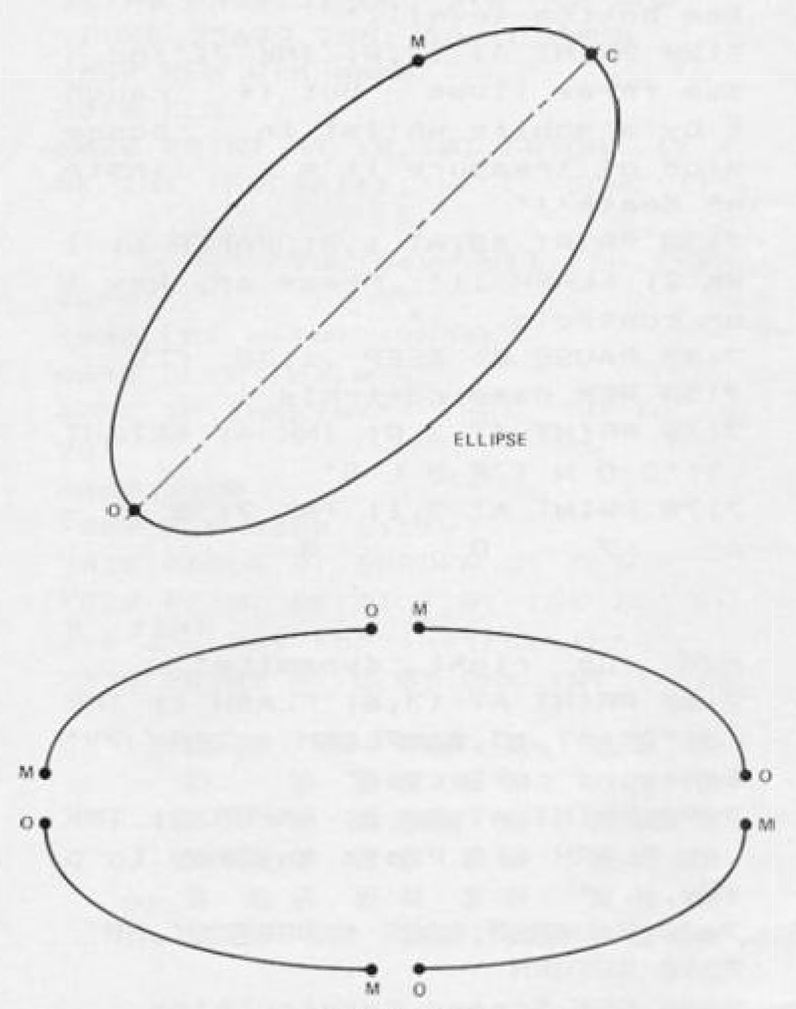


Figure 2: How to draw the curves.

E452 32	DEFB 32	Jump displacement to TEST__CPOS
DB86 61 E5	DEFW E561,TEXT__MODE	Link in text procedure
DB46 1B E7	DEFW E71B,Q__ELLIPSE	Link in quarter ellipse procedure
DB5E 90 E6	DEFW E690,ELLIPSE	Link in ellipse procedure

Figure 3. Alterations to last issue's routines.

drawn.

(2) That HL contains the address of a subroutine which calculates the next point on the curve, and possibly

(3) if this subroutine requires any quantities stored in calculator memories, that such memories are initialised.

CREATE__MEM will create new calculator memories. It requires that BC contains five times the number of memories needed. On return the new memories will be numbered from M0 upwards and should all be considered to contain rubbish. Note that it is usually necessary to restore all calculator memories to normal before returning to BASIC, and this may be done by loading MEM (at address 5C68) with the value 5C92.

At address E690 is the ELLIPSE subroutine itself. All it requires is that the three cursors are in the right place on the screen. It works by first calculating Px and Py — the coordinates of the centre of the ellipse, and then calculating a, the length of half of the major axis. It then calls the ANGLE subroutine listed in part 8 to work out s, the inclination of the ellipse. Next it has to work out b, the length of the minor axis, which it does by first working out u and v (see figure 1). It sets up the memories ready to draw the ellipse and uses the ELL__Q subroutine to do the actual drawing.

STK__REGS is quite a boring subroutine really. All it does is to put the contents of the registers onto the calculator stack in the order, L,H,E,D,C,B — with B being at the top.

At address E71B is the QUARTER ELLIPSE procedure. This first of all works out which quadrant the quarter-ellipse falls into, then sets up the memories and uses ELL Q to do the drawing.

How to use the Procedures

To use the ELLIPSE procedure you need to place the Origin Cursor and the Main Cursor at either end of the major axis, with the Marker Cursor at any other point on the ellipse. Figure two will show you what I mean.

The QUARTER ELLIPSE is a little different. Whereas a whole ellipse may be drawn at any angle, a quarter ellipse must always be upright (with the major axis horizontal). A quarter ellipse will always be drawn anticlockwise from the origin cursor to the main cursor. Again, figure two will show you what I mean. One final thing I should point out is that BREAK will work throughout the drawing of these curves. If you press CAPS SHIFT with SPACE whilst the program is in the middle of drawing a curve then the program will simply stop drawing the curve and return to the main Light Screen Designer program.

The next article will be the final part in the Light Screen Designer series. It will complete the program, by talking about painting, or colouring in, outlines. See you then.

Toni Baker

M0 not used.	Note that memories M0, M1 and M2
M1 not used.	are corrupted by the functions
M2 not used.	SIN and COS.
M3 i	The increment of the angle t on each pass of the loop.
M4 s	The inclination of the major axis to the horizontal.
M5 t	Eccentric angle of point (x,y) on ellipse.
M6 a	Half on the major axis.
M7 b	Half on the minor axis.
M8 Mx-Px	
M9 My-Py	
MA a*cos t	
MB b*sin t	
MC cos s	
MD sin s	
ME Px	x coordinate of centre of ellipse.
MF Py	y coordinate of centre of ellipse.

Figure 4. Use of calculator memories.

```
                      ORG E5FE
EF         ELL_SUB    RST 28                Engage the calculator.
EE                    recall ME             Px
E5                    recall M5             Px,t
20                    cos                   Px,cos t
E6                    recall M6             Px,cos t,a
04                    multiply              Px,a*cos t
CA                    store MA              (MA:= a*cos t).
EC                    recall MC             Px,a*cos t,cos s
04                    multiply              Px,a*cos s*cos t
0F                    add                   Px+a*cos s*cos t
E5                    recall M5             Px+a*cos s*cos t,t
1F                    sin                   Px+a*cos s*cos t,sin t
E7                    recall M7             Px+a*cos s*cos t,sin t,b
04                    multiply              Px+a*cos s*cos t,b*sin t
CB                    store MB              (MB:= b*sin t).
ED                    recall MD             Px+a*cos s*cos t,b*sin t,sin s
04                    multiply              Px+a*cos s*cos t,b*sin s*sin t
03                    subtract              Px+a*cos s*cos t-b*sin s*sin t
A2                    const half            Px+a*cos s*cos t-b*sin s*sin t,½
0F                    add                   Px+a*cos s*cos t-b*sin s*sin t+½
27                    int                   x
EF                    recall MF             x,Py
EA                    recall MA             x,Py,a*cos t
ED                    recall MD             x,Py,a*cos t,sin s
04                    multiply              x,Py,a*sin s*cos t
0F                    add                   x,Py+a*sin s*cos t
EB                    recall MB             x,Py+a*sin s*cos t,b*sin t
EC                    recall MC             x,Py+a*sin s*cos t,b*sin t,cos s
04                    multiply              x,Py+a*sin s*cos t,b*cos s*sin t
0F                    add                   x,Py+a*sin s*cos t+b*cos s*sin t
A2                    const half            x,Py+a*sin s*cos t+b*cos s*sin t,½
0F                    add                   x,Py+a*sin s*cos t+b*cos s*sint t+½
27                    int                   x,y
E5                    recall M5             x,y,t
E3                    recall M3             x,y,t,i
0F                    add                   x,y,t+i
C5                    store M5              (M5:= newly incremented angle t+i).
02                    delete                x,y
38                    end calc              Disengage the calculator.
C9                    RET
```

```
                      ORG E626
F5         ELL_Q      PUSH AF               Stack the carry flag.
EF                    RST 28                Engage the clsculator.
E6                    recall M6             a
E7                    recall M7             a,b
0F                    add                   a+b
34B00E2C19            stk data pi/(2*sqr 2) a+b,pi/(2*sqr 2)
04                    multiply              (a+b)*pi/(2*sqr 2)
27                    int                   int ((a+b)*pi/(2*sqr 2))
A1                    const one             int ((a+b)*pi/(2*sqr 2)),1
0F                    add                   N
31                    duplicate             N,N
A3                    const pi/2            N,N,pi/2
01                    exchange              N,pi/2,N
05                    divide                N,i
C3                    store M3              (M3:= i, the increment in angle).
02                    delete                N
38                    end calc              Disengage the calculator.
CDA22D                CALL 2DA2,FP_TO_BC    BC:=N (number of increments in
                                                  a quarter ellipse).
F1                    POP AF                Restore the carry flag.
3806                  JR C,DR_ELL           Jump if only quarter ellipse reqd.
60                    LD H,B
69                    LD L,C
29                    ADD HL,HL
29                    ADD HL,HL
44                    LD B,H
4D                    LD C,L                BC:= 4*N.
21FEE5     DR_ELL     LD HL,ELL_SUB         HL:= address of ellipse subroutine.
```

▶

```
                   ORG E64A
C5        CURVE    PUSH BC                Stack number of passes.
E5                 PUSH HL                Stack address of subroutine.
CD2C16             CALL 162C,CALL_JUMP    Call subroutine required.
CDDC22             CALL 22DC,PLOT         Plot the first point.
E1                 POP HL                 HL:= subrt address.
C1                 POP BC                 BC:= number of passes.
C5        CV_LOOP  PUSH BC
E5                 PUSH HL
CD2C16             CALL 162C,CALL_JUMP    Call subroutine.
CD0723             CALL 2307,STK_TO_BC    B:=x; C:=y;
110101             LD DE,0101
78                 LD A,B                 A:= x.
FD9644             SUB (COORDS_X)         A:= x displacement.
3004               JR NC,CV_1
16FF               LD D,FF                D:= FF to indicate x disp negative.
ED44               NEG                    A:= abs(x displacement).
47        CV_1     LD B,A                 B:= ABS(x displacement).
79                 LD A,C                 A:= y.
FD9643             SUB (COORDS_Y)         A:= y displacement.
3004               JR NC,CV_2
1EFF               LD E,FF                E:= FF to indicate y disp negative.
ED44               NEG
4F        CV_2     LD C,A                 C:= ABS(y displacement).
CDBA24             CALL 24BA,DRAW_3       Draw line segment.
CD541F             CALL 1F54,BREAK_KEY    Test whether CAPS SHIFT/SPACE pressed.
E1                 POP HL
C1                 POP BC
3005               JR NC,CV_EXIT          Jump if so.
0B                 DEC BC
78                 LD A,B
B1                 OR C
20D0               JR NZ,CV_LOOP          Loop back if not finished.
215827    CV_EXIT  LD HL,2758
D9                 EXX                    HL':= 2758.
C9                 RET
```

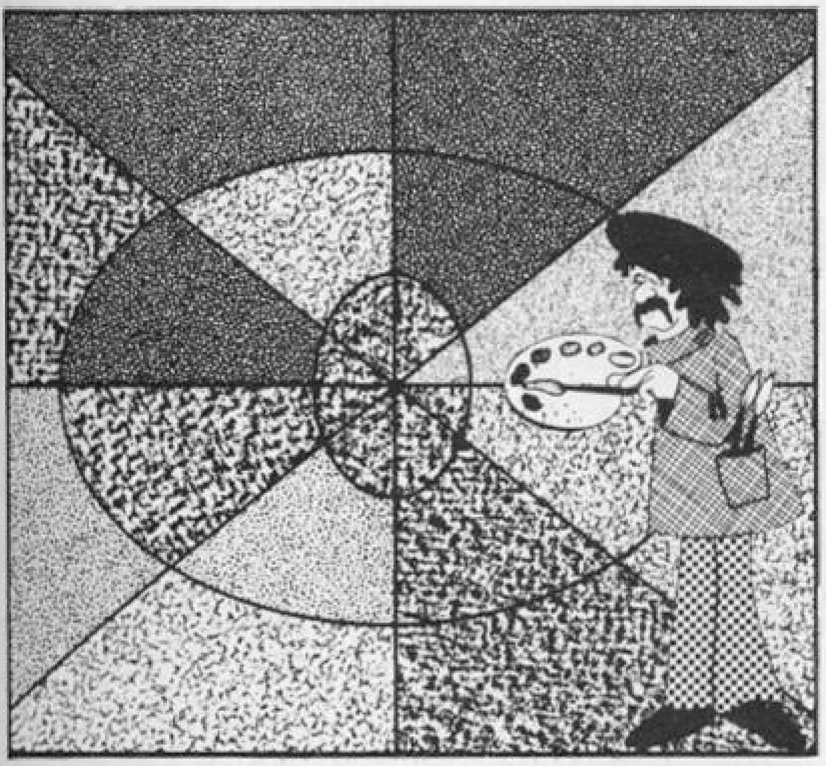
```
                      ORG E689
F7        CREATE_MEM  RST 30                   Create memory in workspace.
1B                    DEC DE                   DE: points to first byte of area.
ED53685C              LD (MEM),DE              Point calculator memory to area.
C9                    RET

                      ORG E690
CD22E0    ELLIPSE     CALL E022,TEST_MARKER    Return if marker cursor not in use.
C5                    PUSH BC                  Stack cursor coordinates.
CD0AE2                CALL E20A,START_LINE     Get cursor coords into calc mems.
EF                    RST 28                   Engage the calculator.
E2                    recall M2                My
E3                    recall M3                My,Mx
E0                    recall M0                My,Mx,Oy
E4                    recall M4                My,Mx,Oy,Cy
0F                    add                      My,Mx,Cy+Oy
A2                    const half               My,Mx,Cy+Oy,½
04                    multiply                 My,Mx,Py
31                    duplicate                My,Mx,Py,Py
E4                    recall M4                My,Mx,Py,Py,Cy
03                    subtract                 My,Mx,Py,Py-Cy
31                    duplicate                My,Mx,Py,Py-Cy,Py-Cy
04                    multiply                 My,Mx,Py,(Py-Cy)^2
E5                    recall M5                My,Mx,Py,(Py-Cy)^2,Cx
E1                    recall M1                My,Mx,Py,(Py-Cy)^2,Cx,Ox
0F                    add                      My,Mx,Py,(Py-Cy)^2,Cx+Ox
A2                    const half               My,Mx,Py,(Py-Cy)^2,Cx+Ox,½
04                    multiply                 My,Mx,Py,(Py-Cy)^2,Px
C3                    store M3                 (M3:= Px).
E5                    recall M5                My,Mx,Py,(Py-Cy)^2,Px,Cx
03                    subtract                 My,Mx,Py,(Py-Cy)^2,Px-Cx
31                    duplicate                My,Mx,Py,(Py-Cy)^2,Px-Cx,Px-Cx
04                    multiply                 My,Mx,Py,(Py-Cy)^2,(Px-Cx)^2
0F                    add                      My,Mx,Py,(Py-Cy)^2+(Px-Cx)^2
E3                    recall M3                My,Mx,Py,(Py-Cy)^2+(Px-Cx)^2,Px
01                    exchange                 My,Mx,Py,Px,(Py-Cy)^2+(Px-Cx)^2
28                    sqr                      My,Mx,Py,Px,a
01                    exchange                 My,Mx,Py,a,Px
C3                    store M3                 (M3:= Px).
02                    delete                   My,Mx,Py,a
```

```
01        exchange              My,Mx,a,Py
C2        store M2              (M2:= Py).
E3        recall M3             My,Mx,a,Py,Px
38        end calc              Disengage the calculator.
CD65E2    CALL E265,ANGLE       Calculate the inclination, s,
                                of the major axis to the horizontal.
015000    LD BC,0050
CD89E6    CALL E689,CREATE_MEM  Create sixteen calculator memories.
EF        RST 28                Reengage the calculator.
                                My,Mx,a,Py,Px,s
C4        store M4              (M4:= s).
02        delete                My,Mx,a,Py,Px
CE        store ME              (ME:= Px).
02        delete                My,Mx,a,Py
CF        store MF              (MF:= Py).
02        delete                My,Mx,a
C6        store M6              (M6:= a).
02        delete                My,Mx
C8        store M8              (M8:= Mx).
02        delete                My
C9        store M9              (M9:= My).
02        delete
E4        recall M4             s
20        cos                   cos s
CC        store MC              (MC:= cos s).
E4        recall M4             cos s,s
1F        sin                   cos s,sin s
CD        store MD              (MD:= sin s).
E8        recall M8             cos s,sin s,Mx
EE        recall ME             cos s,sin s,Mx,Px
03        subtract              cos s,sin s,Mx-Px
C8        store M8              (M8:= Mx-Px).
04        multiply              cos s,(Mx-Px)*sin s
1B        negate                cos s,-(Mx-Px)*sin s
01        exchange              -(Mx-Px)*sin s,cos s
E9        recall M9             -(Mx-Px)*sin s,cos s,My
EF        recall MF             -(Mx-Px)*sin s,cos s,My,Py
03        subtract              -(Mx-Px)*sin s,cos s,My-Py
C9        store M9              (M9:= My-Py).
04        multiply              -(Mx-Px)*sin s,(My-Py)*cos s
0F        add                   u
```

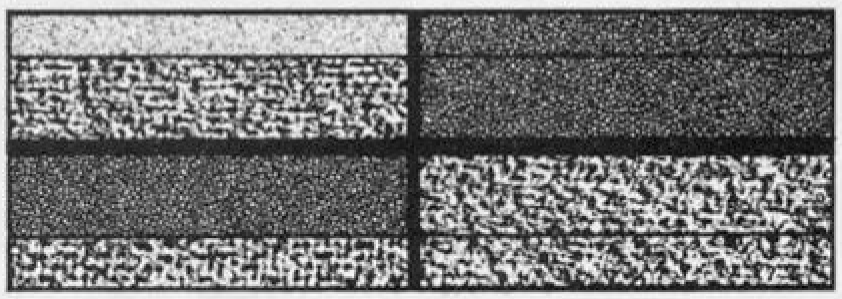


```
A1                  const one             u,1
E8                  recall M8             u,1,Mx-Px
EC                  recall MC             u,1,Mx-Px,cos s
04                  multiply              u,1,(Mx-Px)*cos s
E9                  recall M9             u,1,(Mx-Px)*cos s,My-Py
ED                  recall MD             u,1,(Mx-Px)*cos s,My-Py,sin s
04                  multiply              u,1,(Mx-Px)*cos s,(My-Py)*sin s
0F                  add                   u,1,v
31                  duplicate             u,1,v,v
04                  multiply              u,1,v^2
E6                  recall M6             u,1,v^2,a
31                  duplicate             u,1,v^2,a,a
04                  multiply              u,1,v^2,a^2
05                  divide                u,1,v^2/a^2
03                  subtract              u,1-v^2/a^2
28                  sqr                   u,sqr(1-v^2/a^2)
05                  divide                b
C7                  store M7              (M7:= b, the minor axis).
02                  delete
A0                  const zero            0
C5                  store M5              (M5:= t:= 0).
02                  delete
38                  end calc              Disengage the calculator.
CD38DF              CALL DF38,CANCEL_MARK Cancel the marker cursor.
A7                  AND A                 Reset carry to indicate ellipse.
CD26E6    ELL_2     CALL E626,ELL_Q       Draw the ellipse.
CDBF16              CALL 16BF,SET_WORK    Clear workspace and restore calc mems.
C399ED              JP ED99,CC_MOVE       Move the origin cursor and return.
```



```
                    ORG E706
C5        STK_REGS  PUSH BC
D5                  PUSH DE
E5                  PUSH HL
0603                LD B,03
E1        STRG_LOOP POP HL               HL:= next reg pair from stack.
C5                  PUSH BC              Stack B.
E5                  PUSH HL              Stack H.
7D                  LD A,L
CD282D              CALL 2D28,STACK_A    Stack one reg onto calc stack.
E1                  POP HL
7C                  LD A,H
CD282D              CALL 2D28,STACK_A    Stack one reg onto calc stack.
C1                  POP BC
10F1                DJNZ STRG_LOOP
C9                  RET
```

```
                    ORG E71B
C5        Q_ELLIPSE PUSH BC              Stack cursor coordinates.
ED5B0EDB            LD DE,(ORIGIN+2)     DE:= Origin cursor coords.
7A                  LD A,D               A:= Oy'
90                  SUB                  A:= difference in y coords.
3810                JR C,QEL_2
67                  LD H,A               H:= b, minor axis.
7B                  LD A,E               A:= Ox
91                  SUB C                A:= difference in x coords.
3805                JR C,QEL_1
6F                  LD L,A               L:= a, major axis.
3E01                LD A,01              A:= quadrant number.
1818                JR QEL_5
ED44      QEL_1     NEG
6F                  LD L,A               L:= a, major axis.
AF                  XOR A                A:= 0, quadrant number.
180A                JR QEL_5
ED44      QEL_2     NEG
67                  LD H,A               H:= b, minor axis.
7B                  LD A,E               A:= Ox
91                  SUB C                A:= difference in x coords.
3806                JR C,QEL_4
6F                  LD L,A               L:= a, major axis.
3E02                LD A,02              A:= quadrant number.
4B        QEL_3     LD C,E               BC:= coords of ellipse centre.
1806                JR QEL_6
ED44      QEL_4     NEG
6F                  LD L,A               L:= a, major axis.
3E03                LD A,03              A:= quadrant number.
42        QEL_5     LD B,D               BC:= coords of ellipse centre.
1600      QEL_6     LD D,00              D:= 0, inclination of ellipse.
5F                  LD E,A               E:= quadrant number.
CDEADE              CALL DEEA,ADJUST_B   Adjust coords to ROM convention.
CD06E7              CALL E706,STK_REGS   Put regs onto calculator stack.
015000              LD BC,0050
CD89E6              CALL E689,CREATE_MEM Create sixteen calculator memories.
```



```
EF                  RST 28               Engage the calculator.
                                         a,b,q,0,Px,Py
CF                  store MF             (MF:= Py).
02                  delete               a,b,q,0,Px
CE                  store ME             (ME:= Px).
02                  delete               a,b,q,0
C4                  store M4             (M4:= s:= 0; inclination of ellipse).
CD                  store MD             (MD:= sin s:= 0).
02                  delete               a,b,q
A1                  const one            a,b,q,1
CC                  store MC             (MC:= cos s:= 1).
03                  subtract             a,b,q-1
A3                  const pi/2           a,b,q-1,pi/2
04                  multiply             a,b,(q-1)*pi/2
C5                  store M5             (M5:= t:= angle corresponding
                                          to start of curve).
02                  delete               a,b
C7                  store M7             (M7:= b).
02                  delete               a
C6                  store M6             (M6:= a).
02                  delete
38                  end calc             Disengage the calculator.
37                  SCF                  Set carry to indicate
                                          quarter ellipse only.
C3FAE6              JP E6FA,ELL_2        Draw curve and finish off.
```

Mindplay

The adventure market at the moment seems to be swamped with adaptions, be they of TV shows, or books. This begs the question 'is anyone producing original games these days?'. We've also got a plethora of graphic adventures which are often poor text adventures with useless pictures or so called 'animated' adventures.

Whatever happened to Ye Olde Text Adventure? There doesn't seem to have been an original and enjoyable text adventure for ages. Is it a dead art? I'm sure the market is still there, but the software houses believe a game won't sell without pictures. I'm not anti-graphics in fact they can in some cases add greatly to a game. Occasionally I'd like to take a stab at a good, frustrating and lengthy text adventure, but very few are released now. It's a pity, because the genre is far from exhausted. Even Level 9 now add graphics to their games.

Anyday now I expect a revival of text only adventures sweeping away often useless graphics and giving us a rip roaring plot instead with plenty of fiendish problems. Ah, well, wishful thinking, I suppose!

Just to repeat what I said last issue, I'd like to hear from you. What do you think of adventure games in general? What about market trends and the quality of product the software house present you with? Also, specific problems with adventures would be welcome. As I can't possibly play everything, offers of help and solutions to particular problems would also be greatfully received. All letters, problems and solutions should be addressed to: Mindplay, ZX Computing, 1 Golden Square, London, W1R 3AB.

The Never Ending Story
Ocean Software
£9.95

The Never Ending Story — was originally a novel, a film, and has now resurfaced as a computer adventure game. The micro version of the story is a graphic text adventure with illustrations for some locations, all objects and some special events. The game is split into three parts comprised of over 100K of data and code. Objects carried and the current 'condition' of your character is carried from one part to another.

The use of graphics in the game is relatively unusual compared with the majority of graphic adventures. The screen dislay is split in two halves, with the lower section reserved for the adventure's text. the graphics inhabit the top half of the screen. This itself is in turn sub-divided. There is a background scene which fills the graphics area and other graphics are printed over this. These 'other' graphics include pictures of every object in the game. Although you can only carry five at a time only five can be displayed at one time. The sixth place in the object display area is taken up with a cute picture of one of your two possible companions.

Larger screen illustrations for locations and special events are displayed in the top left of the screen. The instructions claim the graphics are not intended to replace the text but merely to enhance it. They are certainly not sophisticated enough to replace the text, but the neat layout and interesting little pictures certainly add something to an otherwise lacklustre game.

As to the story itself, it broadly follows the plot of the original book. The game is set in Fantasia a world of the imagination facing extinction by the 'all consuming nothing', eroding its very fabric and condemning it to oblivion. The world needs a hero from the 'Real World' (that's you!), someone who will believe in Fantasia and so save it from disaster. In the game the player takes the part of Atreyu, and must find the saviour of Fantasia. Only through your endeavours will the kingdom be restored to glory. There is certainly nothing in the plot that adventurers would see as particularly original. It's another variation on the old fantasy land plot. The colour graphics, add something to this game, making it an enjoyable, if standard adventure.



The Ludoids Adventures
Bug Byte
£2.95

This is a real-time four part adventure with animated graphics, taking you on a journey through time and space to defeat the Ludoid menace. It's not bad either!

So, just who are these Ludoids? Apparently, they are a group of cosmic Vegans(don't ask what they are!) who have infiltrated the corrupt 'Newtonian Rocket Co.' with the aim of disrupting the galactic Free Trade's revolutionary Trans-Mat transport system. Your aim is to hunt out and destroy Trans-Mat jamming equipment planted around the galaxy by the Ludoids, and so utimately defeat the Ludoid menace! this is a fairly original variation on the old quest plot and the game features several original, humourous touches such as the Rambo of the micro world Rambot! This depressive killer robot is out to get you and provides an extra hazard in your wanderings around the galaxy in search of the jammers.

The game is a 'Quadraplex Adventure', which is Bug Byte's way of saying it's split into four parts. The first part is set in the 'CapShift' space bar (!), with the following three on the planets ofg Glacia (pretty cold), Vacatia (nice and relaxing) and Aqua (lifejacket required). There is plenty of tongue in cheek humour throughout the game which certainly helps to brighten it up.

As to the graphics, well they are slightly animated. For instance after ordering from the food machine a tray complete with munchies appears to drift from the machine. The graphics are full screen illustrations, most of them very good, which scroll off the screen to allow the text to take over and the majority of locations feature an illustration.

At the end of each of the games four sections you find coded co-ordinates left by friendly agents which give you access to the next section. The friendly agents, though, are not friendly enough to give you a hand in completing your task to overcome the Ludoids!

All in all, a very enjoyable and entertaining game, with nice touches. I look forward to the Ludoids return in the not too distant future.

The Quest For The Holy Grail
Mastertronic
£1.99

This game, I seem to remember, was released quite a while ago by Dream Software. It now appears under the Mastertronic banner as part of their assault on the budget software market. Mastertronic have produced several adventures at a budget price, but none of them have been particularly original or imaginative.

The Quest For The Holy Grail claims to be Monty Python with chips! Unfortunately, the game doesn't live up to this tag. It attempts to emulate the Python teams humour, but I can't help feeling that John Cleese and co. would be embarrassed to be associated with this game. While it is a passable adventure, the Monty Python connection is very loose. Something I would like to see would be an OFFICIAL Monty Python game — that could be interesting!

Back to the game in hand. Your aim is to guide bold Sir Tappen through the medieval terrors in search of the legendary Holy Grail. The landscape is filled by several weird characters who do strange things. There is the three headed knight who has a lot on his shoulders and others with odd names such as NC, LC and SC. To be avoided at all costs is the rampant killer white rabbit, who literally has an explosive personality. All this is mildly amusing but never 'zany' as claimed on the cassette inlay. The text part of the adventure is quite enjoyable, humorous in places, but, nothing remarkable.



The real problem with this game is it's graphics. These really show the game's age, being square chunky block graphics with the occasional sparse line drawing. The graphics are really disappointing. Compared to these the graphics of Never Ending Story are positive masterpieces.

This game could have been so much more but, unfortunately at no point does the game live up to the inlays promise that it is '. . the computer game to surpass all others.' It most definitely is not. It's more a very average game with touches of humour and outdated graphics.

Brian Robb

Tortoise Wise
More thoughts from a parent who gets left behind.

Yes, of course I've felt like 'Turning Turtle' more than just a few times. But — a gentle reminder to the kind reader who wrote to TURTLEWISE — it's TORTOISE Sir, and proud of it to boot.

The competition still seems formidable as I look over the shoulders of the younger generation, hunched over their keyboards during their non-sleeping, non-eating hours.

I used to ask innocently,

'Can you explain what you are trying to do in this program son?' But that is rather like sticking your head under the guillotine these days. The temptation to lop great chunks from my already fragile dignity is too great for them.

I stay on watch. On the defence. Learning their little ploys to weaken my morale. My motto, Tortoisewise, is 'Slowly but surely . . .'.

'Dad,' says the eldest son earnestly, while I relax in front of the box watching a favourite programme (spelt with ME at the end of the word).

'Dad, I'm getting a RETURN without GOSUB error report. Shall I check to see if a GOTO has been entered instead of a GOSUB in the program?'

Stay calm, I think to myself. This is not a genuine enquiry. It is meant to make me look stupid. Don't take your eyes off the screen, answer calmly and confidently — 'Surely you know the answer to that one by now, don't you?' To which the reply is something along the lines of, 'Of yes. Of course I know. I was just checking to see if YOU knew . . .' And then there is a haughty laugh.

But you get used to that laugh. As parents we get used to that laugh. It is the same laugh that greets your gyrations on the dance floor at Christmas parties with the family. The same laugh that greets your flares every time you were them, or your records when you play them, the grey hairs, the middle age spread . . . we've met it before.

Try a retort like, 'They laughed at Marconi you know' or 'they laughed at Copernicus.' That usually stalls them for a while, and gives you a chance to show off a bit of non-micro based knowledge. So do not despair. Indeed, a word of comfort to the reader who wrote that the only Machine Code she is ever likely to learn, is found on the labels of washing that piles up around the house. My sons may be familiar with a programmable Interface. But it will be years before they are familiar with our programmable washing machine . . .

It is a waiting game.

A year ago, the eldest son confidently stated his conviction that in his life girls could never take the place of computers. He lavished his time and money on his Spectrum and may even have kissed it goodnight for all I know. What I do know is that since then, puberty has smacked him between his eyeballs and some days he's all over the place. Do I buy a new game or a new record? Do I spot the bugs in a program or try not to be bugged by the spots on my nose? Do I sit at the keyboard and turn on the Spectrum or do I sit at a friend's house and get turned on by his eldest sister?

We parents have lived with this state of affairs for years. It is called CONFUSION and there is nothing quite like it for closing the gap, Tortoisewise.

I can't wait until he 'falls in love'. That's when I'll quietly nip out and buy that QL and printer . . .

David Stewart

We, the jury . . .

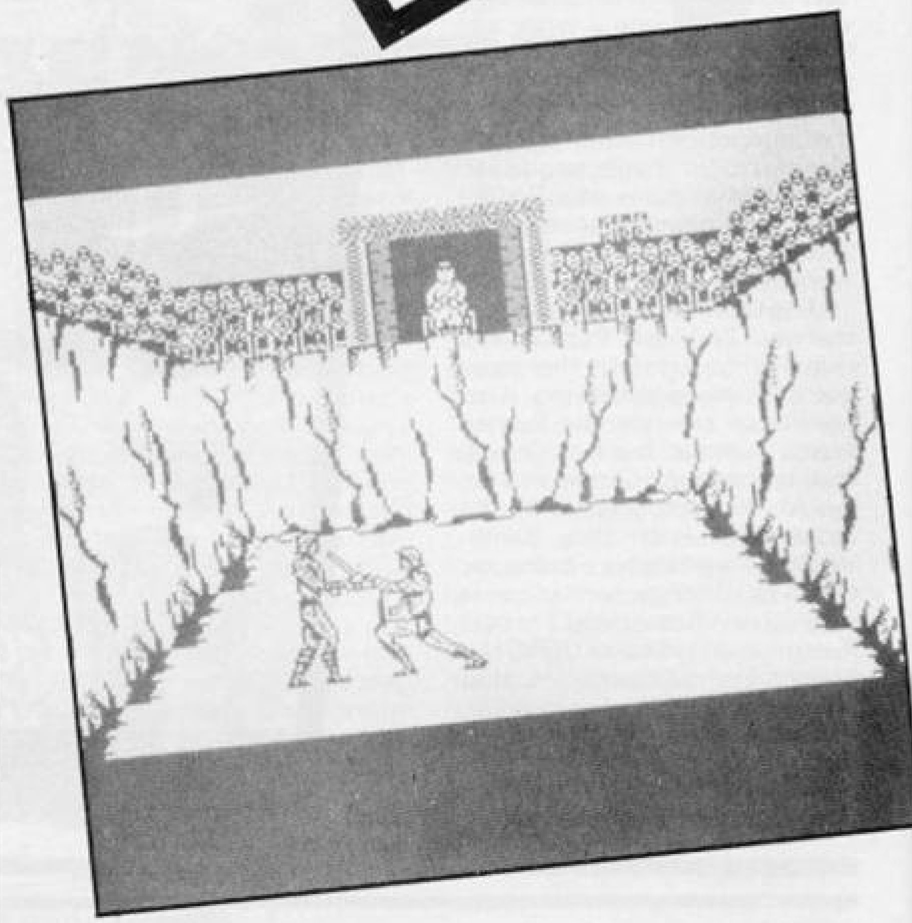


Gladiator
Domark
£8.95

Gladiator shows life at the sharp end of the Roman empire as you hone your combat skills to avoid death in the arena and work your way up to become the Emperor's champion.

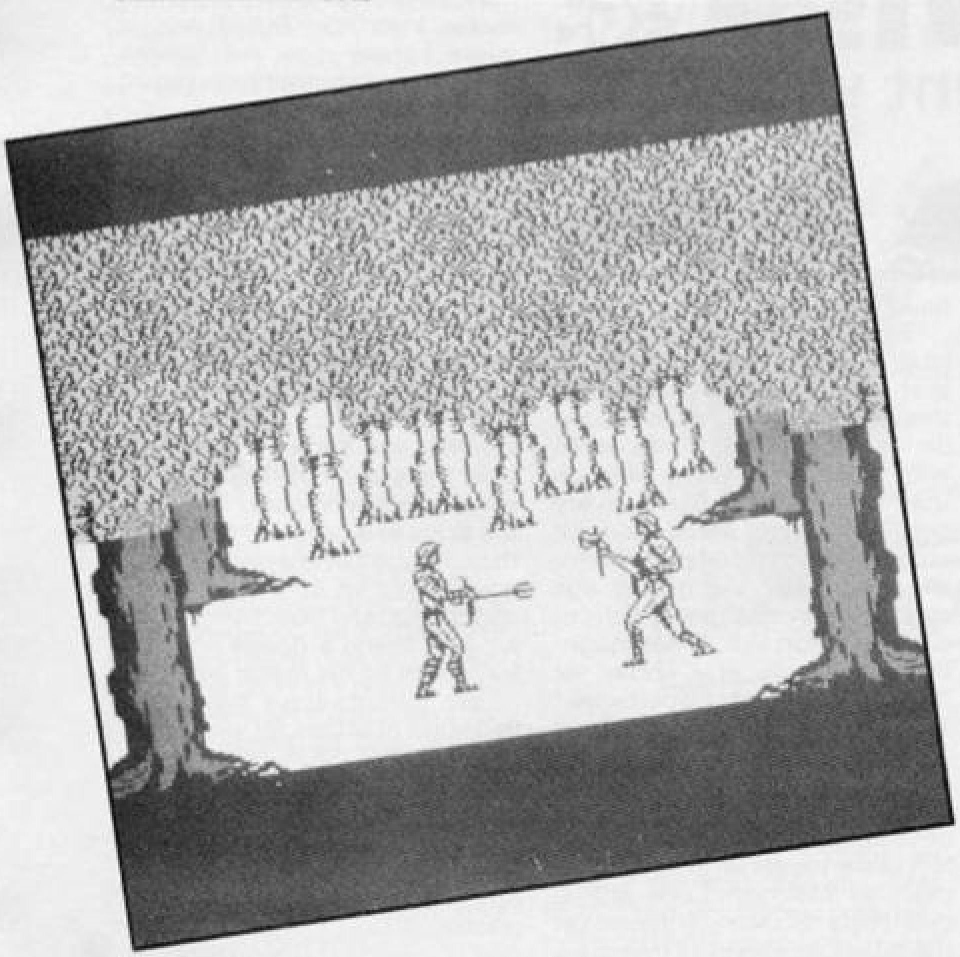
Before going into the arena for real you can watch two practiced gladiators hacking away at each other and make a wager on the outcome. To prepare yourself it is advisable to experiment with the various movements and weapons at your disposal on a stationary opponent in a two player mode. This however, can be more difficult than you imagine as if you get too close you may walk onto the sword of your inert adversary.

When you have lunged, jabbed, parried and thrust to an acceptable standard you are ready for the contest to begin. An imporant element is choosing your weapons — an armoury of daggers, swords, lances, nets and tridents can be used or if you feel defensive there is a choice of shields. In all there are 45 options from which you can select three. You won't see what fiersome weapons your computer champion has opted for until you are face to face.





Defeated Gladiator heading for the thumbs down.





Unarmed Gladiator sprites demonstrating "the lunge".

The controls are complex andtake time to master either on the keyboard or with joystick, there are 25 separate movements and many require a double-burst on the joystick. While you are still improving your gladiator skills you will have to get used to playing pincushion for your opponent. There are three bouts in each game and your defeat or victory is confirmed by looking to the Emperor — the figure transforms into a huge hand to give the thumbs up or thumbs down signal.

If single combat games appeal to you, Gladiator should provide you with many hours of swashbuckling pleasure and if you want a duelling game with that extra element of difficulty then definitely take a stab at this one.

GRAPHICS	* * * *
ADDICTIVENESS	* * * *
OVERALL	* * * *



Sweevo's World
Gargoyle Games
£7.95

This is the first computer game that's actually made me laugh out loud! Unlike Gargoyle's earlier games that have been quite serious and mentally taxing, Sweevo's World is an enjoyable, tongue-in-cheek romp through the sort of territory originally explored by Ultimate in Knight Lore and Alien 8.

Sweevo is a Self Willed Extreme Environment Vocational Organism, designed to go out into the galaxy and clean up inhospitable planets. The trouble is that, as Self Willed Extreme Environment Organisms go, poor Sweevo is a bit of a failure. he's failed all the tests that the Sweevo machines are meant to undergo (he failed to turn up for the memory test, as he forgot all about it), but his Robo-Master has decided to give him one more chance to redeem himself.

The artificial planetoid, Knutz Folly, created by one mad Baron Knutz and his wife Hazel is populated by all sorts of genetic experiments created by the Baron, and it is Sweevo's task to boldly go where no Sweevo has gone before and clean out the place.

Graphically speaking Knutz Folly bears a strong resemblance to the Starship in Alien 8. The view is the same sort of overhead perspective as in the Ultimate games, and Sweevo, who is an ungainly, but endearing looking character moves diagonally across the screen as he moves around the rooms. Keyboard control of Sweevo is actually better than the control system used by Ultimate, though. Instead of rotating and moving in the direction that he is facing, Sweevo simply moves in one of four directions by using the appropriate keys, and I found this system much easier to use than that of Alien 8/Knightlore.

The rooms of Knutz Folly contain the sort of obstacles, block and traps that have become familiar to games players, but instead of being able to jump over these obstacles Sweevo must locate elevator pads in the rooms which will lift him up. But it's not always obvious how he can use these pads to get around obstacles and Sweevo has to collect objects, such as tins and boots which will come in handy.

Some of the traps that are in his way are very novel. There are great fingers that come thrusting up out of the ground, Incan statues that do the same, and pixie-like creatures that look cute but are absolutely deadly. All these things are large and finely detailed, and very well animated — especially the fingers that have a sort of surreal quality (well, when was the last time that you saw a six foot finger pop up out of nowhere?).

All the screens are drawn in just two colours, in order to avoid attribute clashes, but the overall quality of the graphics is excellent.

The outstanding feature of 'Sweevo's World though, is the warped sense of humour it displays. Some of the deadliest objects in the game are bits of fruit, and the way to recharge Sweevo's energy level is to goose a goose (you see, there's this goose runing around, the one that lays the Golden Eggs, and if you run up behind it and go 'Boo!' then it will recharge your batteries). Oh, and if you walk into a room that has a hole in the floor, then drop though that hole at your peril!

There's much more in Sweevo's World that I could go on about, but the best thing I can say about the game is that I'd rather go back and carry on playing it than sit here and waffle on much longer . . .

GRAPHICS	* * * * *
ADDICTIVENESS	* * * * *
OVERALL	* * * * *



Spellbound
Mastertronic
£2.99

This is a real budget gem from Mastertronic's new M.A.D range (Mastertronic's Added Dimension). Titles on this label will be £1 dearer than the rest of their games, but if Spellbound is an example of the standards that these games will set, then they're going to be worth every penny.

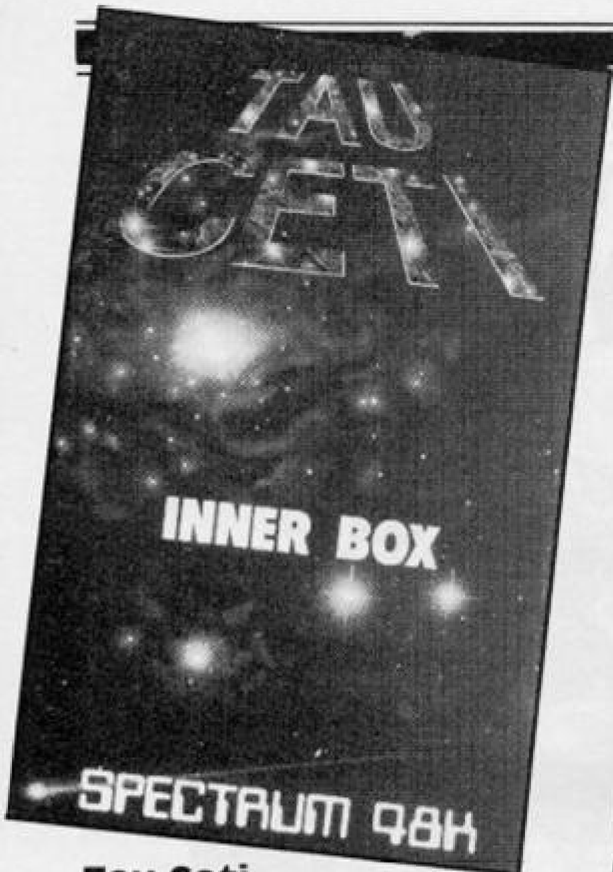
Spellbound is the followup to Finders Keepers, but is a larger and more sophisticated game, which combines arcade action with an adventure style command system.

You play the part of The Magic Knight, who has to rescue Gimbel the Wizard and a number of other characters, from a castle where they have all been trapped after one of Gimbel's spells went wrong. The Knight is a large, finely detailed sprite, who is smoothly animated as he wanders around the rooms of the castle. In his wanderings the Knight will come across the characters he is looking for, as well as a variety of objects that can be used to solve the problems that will bar his way. In solving these problems you are able to use an ingenious system of pull-down menus to assemble some quite sophisticated commands, just as if you were manipulating objects in an adventure. For instance, if you are carrying some objects and you want to use one in some way, by pressing 'fire' you call down the first menu. This presents you with commands such as Get, Drop, Examine, Blow, Cast Spell, and so on. Then by going to the next menu you can specify which object or character that command is to be used on.

All the characters and objects in the game have their own status tables with details of weight, magical energy, state of mind, and other qualities that will allow you to use them during the game. This adds another element of puzzle solving to the game as you have to work out the best way to use all the objects and to keep all the characters safe and happy. And, if that's not enough, there's a time limit and some of the usual arcade-style obstacles and traps to get past as well.

All in all, Spellbound is a game that would be good value even if a few more pounds were added to the price. Mastertronics and the game's author, David Jones, have done very well to produce such an excellent game at such a low price.

GRAPHICS	* * * * *
ADDICTIVENESS	* * * * *
OVERALL	* * * * *



Tau Ceti
CRL
£9.95

Many attempts have been made to combine fast arcade action with complex adventure type guests but none more successfully than this one from CRL.

With a well set sci-fi scenario and a seemingly simple task, to shut down the Fusion reactor in the capital city of Centralis on Tau Ceti, you are set down in one of the cities at the controls of a skimmer. This machine literally bristles with equipment and armaments, a laser, eight heat seeking missiles, anti missile missiles, flares, scanners, compass, shields, night stands and a computer (guaranteed debugged!).

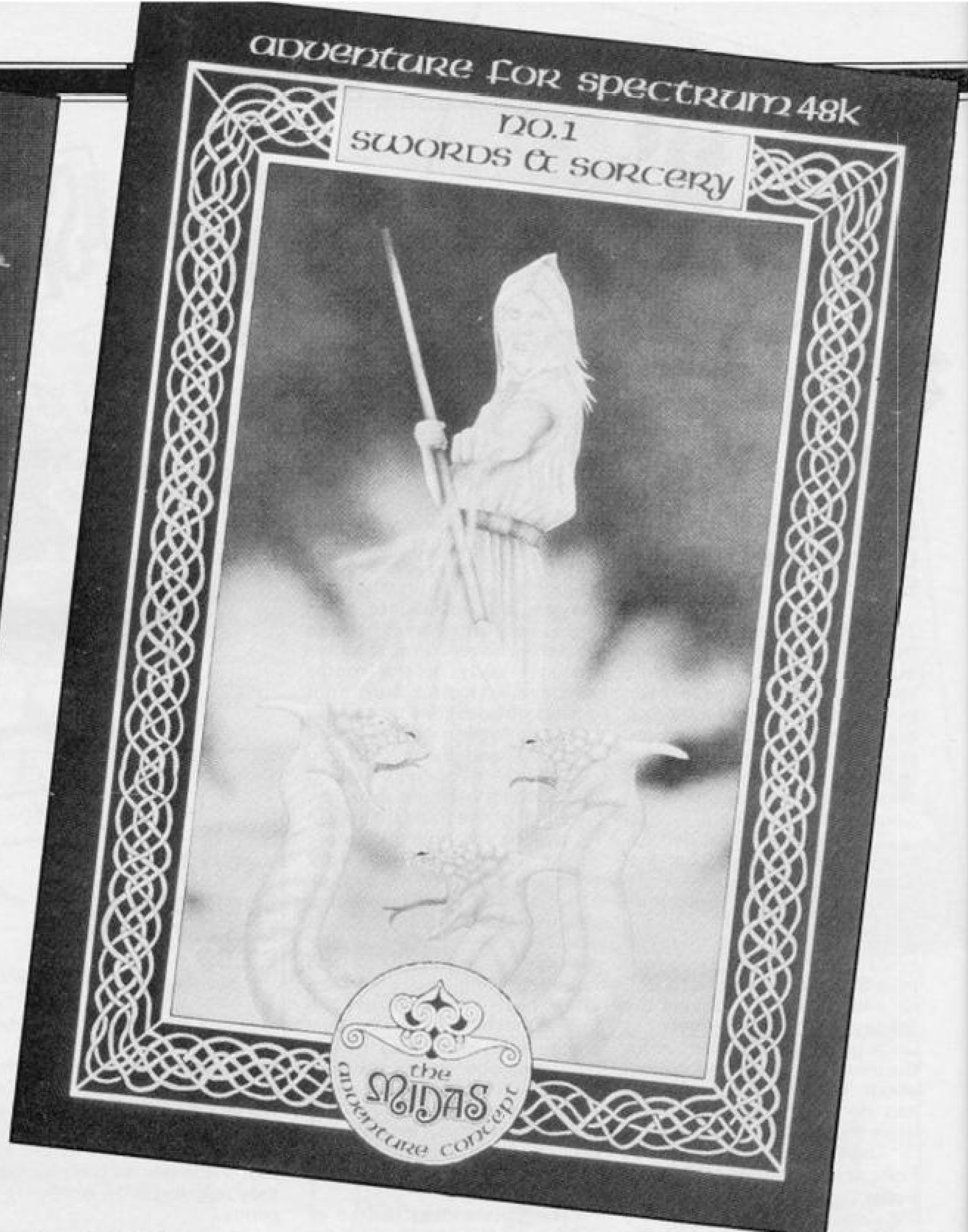
The first plays are used simply getting to know how to use all this equipment and then you have the joy of using adventure style commands to communicate with your camcorder, recognising the various buildings, artifacts and enemy craft, and using the map (very impressive) and teleport system to get around.

The arcade sequences alone would have made a good game, but the additional strategy and thought required puts this game in the same league as Elite.

I know these games don't appeal to everyone, but for those, who like a real challenge in the best of computer gaming this is a must.

This is surely a first for ZXC, another rare six star program.

GRAPHICS	*****
ADDICTIVENESS	*****
OVERALL	******



Swords And Sorcery
PSS
£9.95

This is not really an arcade game and, unlike Tau Ceti which is arcade with an adventure plot, this is strategy with graphics.

I have a friend who bought a Spectrum a year ago because he hoped to play Dungeons and Dragons on it, although several brave attempts have been made, nothing actually satisfied him and eventually he sold it. This program will make him sick that he didn't wait!

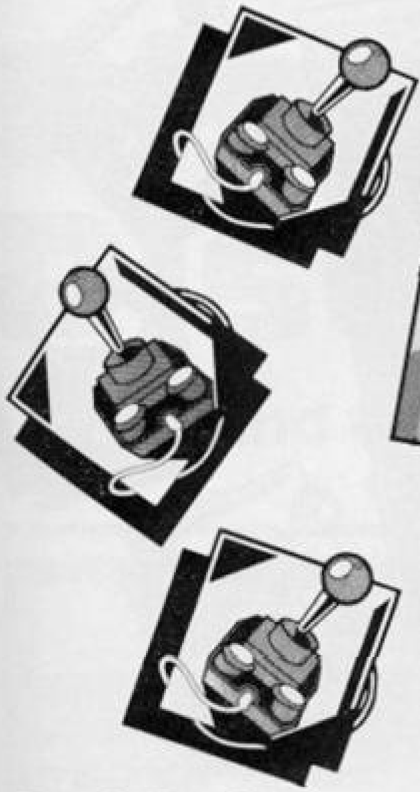
PSS have been promising this program for over a year now, surely the longest wait for a program so far, and we have been gently reminding them at every opportunity. So, now its here, what's it like?

Quite simply it is the best version of Dungeons and Dragons ever produced on a computer. Using only six keys, three for movement and three to access menus, a wide range of actions can be executed. Two large windows are used, the man one at the top centre of the screen is a plan view of the maze showing your position and any monsters in the vicinity. Your character walks around this maze and when you are engaged in battle, it becomes your status screen displaying both the monster's and your own status details.

On the right of the TV screen is a 3D perspective view of what you are facing, this also alters as you move. At the bottom of the screen a window displays actions and conversations which you are engaged in. Finally there is a menu of options which are selected by scrolling them until the one you want is at the far left and then pressing key 9. Initial characters can either be the built-in default one (Flubbit the Dull), you can load a previously saved character from tape or initialise a new character and 'train' him/her.

A little practice is required, but once mastered, using the keys gives fast access to the options which is just as well as the game needs fast decisions. I really enjoyed it and had some fascinating and humorous conversations with some rather strange beings. All is forgiven PSS, swords and sorcery is well worth the wait.

GRAPHICS	*****
ADDICTIVENESS	*****
OVERALL	*****









Beach Head II
US. Gold
£7.95

A shoot 'em up war game from US Gold which I enjoyed more than the original. There are plenty of options — one or two players, three difficulty levels, choice of being attacker or defender and keyboard or joystick options.

The game consists of four phases; attack, rescue, escape and battle. Beach Head II bears some vague resemblance to the arcade game Commando, although the graphics are nowhere near as good.

The graphics are excellent, though small, and they are well animated. Scores tend to be of the massive variety and these are kept on a high score table. Sound is to the Spectrum's usual standard. The machine plays a mean game in the one player mode and should provide a challenge for the most ardent arcadian. I particularly liked the two player mode where you can get rid of your aggression by slaughtering a friend.

There are some who believe that this kind of wanton destruction is morally unhealthy — I suggest they avoid this program. Personally I found this to be a good example of the mindless zap everything that moves game, and I must also admit to enjoying a few plays when the strain of coping with the state of the art mindbenders becomes too much.

GRAPHICS * * *
ADDICTIVENESS * * * *
OVERALL * * *

Gyroscope
Melbourne House
£7.95

I remember owning one of these devices, you spun the wheel inside the frame and as long as it whirled fast enough or didn't hit anything, it would balance upright on virtually anything, a piece of string, a pencil point, or follow a ramp of books.

Why I mention this is because Melbourne House has created a program in which the movement of their gyroscope is incredibly accurate when compared to the real thing!

With some similarities to Marble Madness, now a hit in the arcades, you have to steer this awkward object down five maze-like ramps, each extending over four screens. these are beautifully created in solid 3D perspective and have walls and pits to crash into. As if that is not hard enough, there are steep slopes, slippery glass patches, directional magnets, aliens and narrow ledges to contend with. Oh, and you are racing against the clock, but at least you get seven lives with extra ones for every 1000 points.

I played this game for far longer than I could really spare for the review and found gentle nudging of the joystick (or keys) game me the most control. Another tip — don't let the gyroscope build up too much speed. I completed the first screen after a few plays but only completed the second screen once, and after many attempts a tearing of the hair program.

A mention here of the sound. I am sure they must have used their WHAM program because it is without doubt one of the most impressive bits of music I have heard so far.

Brilliant One of the state of the art programs awarded our rare six star award.

GRAPHICS * * * * *
ADDICTIVENESS * * * * *
OVERALL * * * * * *

I, Of The Mask
Electric Dreams
£9.99

From Ex Quicksilva programmer Sandy White, he of *Ant Attack* and *Zombie Zombie*, comes a graphically stunning, frenetic 3D perspective maze game. Your enemy is time and the only way to get anywhere at all is by quick thinking.

The instructions are vague, but your task is to search the maze and collect the parts of the robot, in the correct order, before your energy is exhausted. It is impossible to simply run around the maze and you have to make frequent and strategic use of the crystals found at each junction. Firing at one will transport you to another junction, another will transport you to a different passage of the maze and the third will reveal a piece of the robot which has to be hit three times on different faces to be collected.

The robot pieces are not identified and you have to learn by experience which is which. Shooting a piece out of order loses one of your three lives.

Your energy runs out at an alarming rate and only by shooting a robot piece can it be replenished. I often had to sacrifice a life in order to keep up the energy. Running out of energy ends the game.

I tried mapping the maze (a full map is available on screen) but the transporting system is not shown.

One for those who enjoy fast thinking, frustrating games.

GRAPHICS * * * * *
ADDICTIVENESS * * *
OVERALL * * * *

Potty Professor
Software Farm
£6.95

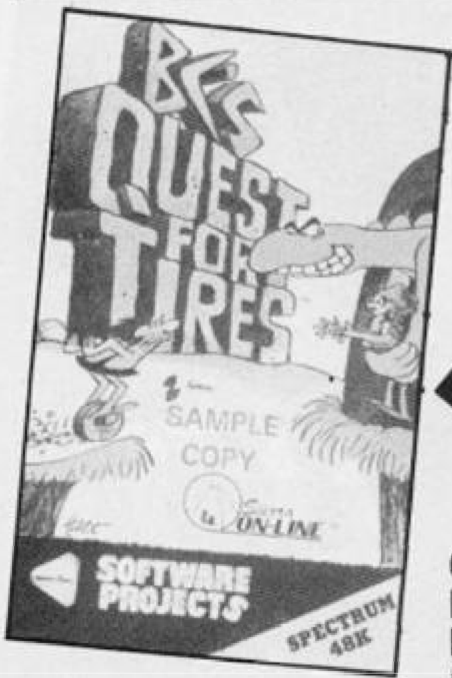
Software Farm, a leader in ZX81 games, turn their hand to the Spectrum market and, as could be expected from a company who established and pioneered Hi-resolution graphics on a machine never designed for them, it is different.

The programmer must be a fan of Heath Robinson. For those who don't know, Robinson was the inventor of the trivia machine, a whole room of complicated machinery linked together to perform some simple act such as lighting a match, and this is the aim of the game. You are presented with a task (the first is to flush the toilet), and a graphic representation of a set of objects. These may be selected and positioned in various places to create a machine to perform the desired task.

Not all of the objects may be required, and some may be needed more than once. The actual task can only be successfully performed when you duplicate the machine that the programmer intended you to use. My moan is that I created several devices which I'm sure would have worked, only to see them collapse when set in operation. Another quibble is the accuract that is needed in postioning the objects, there appears to be very little room for error.

This is an unusual program which will appeal to the lateral thinkers among you and to those of you who enjoy tinkering around with mechanical things. You'll need a lot of patience though.

GRAPHICS * * *
ADDICTIVENESS * * *
OVERALL * * * * ▶



BC's Quest For Tires
Software Projects
£7.95

Direct from comic strip to screen comes Thor of BC. Frantically pedalling his unicycle he faces a formidable task, first he must junp rocks and holes, then duck and jump until he reaches the river.

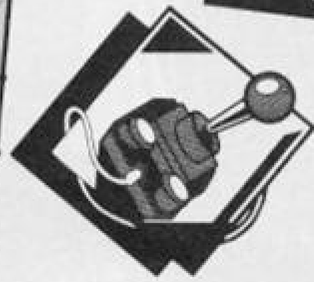
To cross the river he has to leap on the backs of turtles and then hitch a lift on the Dooky Bird. Once he has achieved this he is beset by falling volcanic debris as well as obstacles on the ground until he reaches the cave where Fat Broad and stalactites wait to hinder his final objective of rescuing Cute Chick.

Actions are fairly simple: speed up, slow down, move forward or back, jump and duck. Keyboard use is well thought out, WQMK plus ENTER and the usual joystick options are included. Using a joystick does make life easier with this game.

Graphically this is well designed, the characters are carefully drawn, excellently animated and the backgrounds are attractive. Inevitably there is a little colour clashing due to the limitations of the attribute file and the range of colours used, though personally I did not find this off putting.

For what amounts to a fairly unsophisticated game I found that I had spent an unusually long time 'testing' it and I have gone back to it a few times since. Every time I misjudge an action I kick myself and try again because I KNOW I can do better — is this the definition of addiction?

GRAPHICS * * * *
ADDICTIVENESS * * * * *
OVERALL * * * * *

One Man and his Droid
Mastertronic
£1.99

This is yet another program from Mastertronic which proves that cheap does not always equal nasty.

There have been one or two sheepdog type programs before but in general they were pretty dire. This game has got it right and provides all the irritation ad frustration of dealing with the mindless wool machines that I remember from my days on the farm. Actualy, the game does not have a rural setting but, as the title implies, is set in the future on the planet Andromadous.

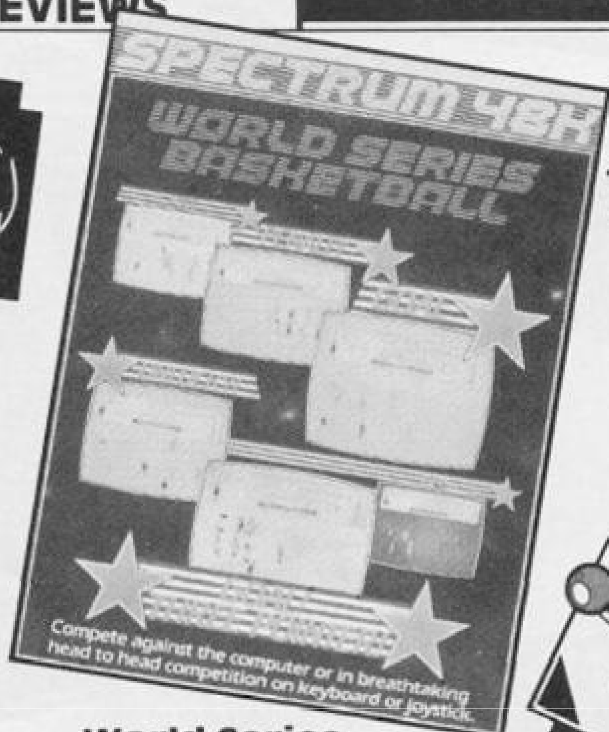
The task is very much in the sheepdog vein as your droid has to round up the six Ramboids in twenty caverns within a time limit and take them in correct order to be transported back to Earth.

Each cavern consists of a maze of tunnels which your droid can fly around, dig himself down to allow Ramboids to pass over him or tunnel through walls. Each operating mode is selected by pressing the fire button and, by holding the fire button down, you will be shown the location of each remaining Ramboid.

Before you can actually begin to round up the flock you have to get from the bottom of the screen to the top past hundreds of 'wild' Ramboids who obstruct your path, this seemingly simple task can be annoyingly frustrating. A nice touch is that at the start of each game you can enter a password which will allow you to begin on the screen you last achieved access to.

An action-packed mind boggler at a great price.

GRAPHICS * * * *
ADDICTIVENESS * * * * *
OVERALL * * * *



World Series Basketball
Imagine
£7.95

This company seems to be specialising in sports simulations at the moment, and seems to prove that specialisation is no bad thing. I used to enjoy playing the old arcade game of Basketball with the roller ball and two players, but this game relegates it to the realms of antiquity.

You can either play against another opponent or against the computer and control a team of four players. The action is fast and you need plenty of practice to win, especially against the computer, even at the lowest of the six skill levels. Luckily a practice mode is provided.

To do well in this game it is not enough to just run with the ball and shoot for the basket, you need to develop the technique of passing to your other players. Control of the players is cleverly done in that the member of your team nearest or actually with the ball is highlighted and under your control. Pressing fire causes him to jump, holding fire causes each player in the team to jump in turn, so when the player you want to control jumps, you release the fire button and control has passed to him.

While the player(s) under control move the computer takes charge of the remainder of the team and tries to move them in an appropriate manner, usually this is very effective although I have seen players immitating headless chickens on occasion.

A challenging, fast, and fairly realistic game.

GRAPHICS * * * * *
ADDICTIVENESS * * * *
OVERALL * * * * *





Grumpy Gumphrey Supersleuth
Gremlin Graphics
£7.95

The copy we received was a preproduction copy and had no instructions whatsoever, so if I get something slightly wrong I claim ignorance!

You appear to be a store detective who is striving to keep his job. Messages appear at the bottom of the screen and I assume you have to deal with them. These tend to vary from the mundane (the boss wants a cup of coffee), to the bizarre (ducks on the ground floor!)

Wandering around, you begin to remember the layout of the store and where various objects can be found. The series or sequence of actions to achieve your objectives is one which you must discover for yourselves. I must admit I have not been able to get very far at all (and I've tried, how I've tried!).

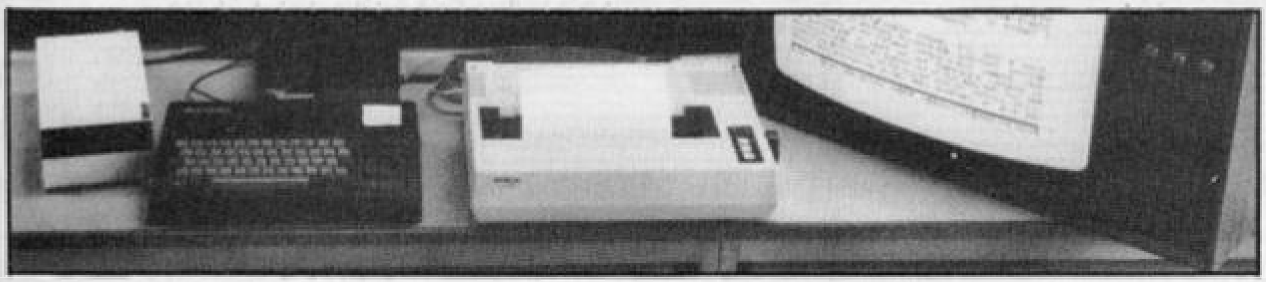
The animation is superb and of the large animated cartoon variety, the other characters are carefully created and all the actiontakes place in a well designed, frustratingly complex building. If this kind of visual arcade puzzle is your cup of team then this game is for you, but personally I find it irritating.

I think there is probably more to this program than I have discovered and so I will simply say that if you liked *Everyone's a Wally* you'll probably enjoy this one, if you are easily frustrated then try it out at your local shop first.

GRAPHICS * * * *
ADDICTIVENESS * *
OVERALL * * * ■

Discovering Discovery

Hints and tips for the Opus disc drive, from John Wase.



The Discovery unit with a second 5.25" disc unit attached, together with my faithful Spectrum and FX-80. Note the extender ribbon cable as recommended by Ray Elder.

The Discovery disc system has had several reviews in the months since its release, ranging from thorough articles to the glib and superficial. It is hard to blame the reviewers for they often only have the item for a few frantic days. However, I've had mine for several months, so perhaps I can add a few hints for potential disc-buyers.

Paging the ROM

For those who *haven't* read the reviews, I'll give a quick explanation of the Discovery's working. Discovery ROM intercepts Spectrum error-messages; if the statement contains a disc command, then the Spectrum ROM is paged out and temporarily replaced by Discovery's ROM. Sinclair himself employed a similar method with his ROM controlled microdrives: in the present case it controls discs. Whilst this presents one or two small problems, it also has compelling advantages.

Because Discovery apes Interface I, it is not compatible with microdrives, (although networking *is* possible via the on-board parallel interface). However, it will accept all BASIC microdrive commands; moreover, these are extended, for instance 'm' channel is default. This makes syntax immediately familiar. Additionally, there is the overriding advantage of direct access to streams and channels.

Reliability and expansion

My experiences with the 3.5" single sided drive Discovery unit have been good. Sceptics might be interested to know that I have as yet had no errors with 3.5" discs — they're incredibly reliable. Their formatted capacity of 178K (about twice that of a microdrive) is, however, still quite low, so I added the RAM chip and a second drive, but mine is a double sided, double density, self powered 5.25" unit of formatted capacity 718K. I've invalidated my guarantee, but enormously increased capacity: (5.25" is still very much a standard — a pity Opus don't market a 5.25" unit since their system obviously runs it).

Although the software is already built in to detect disc size and density, my modification has two disadvantages. Firstly, the two units must be connected to a common mains source: if the switch on the back of Discovery is used, the two discs get out of phase and the system crashes. Secondly, in the original Discovery 2 system, **MOVE "d"; 1 TO "d";2** copies the complete disc from one 3.5" drive to another; however, when I try this the system detects two different disc sizes giving the error report "n wrong disc" (this is not in the handbook, but it's there).

Obscure errors

This brings me to the system itself — a most workmanlike piece of code. So far, I've found no bugs and enquiries have revealed only one (extremely obscure). The error-trapping is a case in point — I've already mentioned one undocumented error report. If you disassemble the ROM, you'll find another — try opening a stream to a stream (the mind boggles, but it's possible!), then try printing it (e.g. OPEN #5; #5: PRINT #5 — those without Discovery can get the error message by sending me an s.a.e.!). The ROM is therefore in many ways different from Sinclair's Interface I ROM, and the hook-codes are different. I am fortunate enough to have acquired a complete table giving more than sufficient information for the average machine-coder, please write to me for a copy.

Tape to disc

BASIC software is very easy to modify; Tasword II's microdrive version goes straight on. Evesham Micro Centre's Interface III transfers even machine-code: transfer to tape and use a header-reader (which they'll supply) up above RAMTOP to give start and length of the three CODE sections, then alter the BASIC loader accordingly.

Peripheral power

Discovery is very reliable. The on-board power supply has attracted unfavourable comment, but in fact has ample spare capacity for any number of add-ons. It is not the quickest disc, (but we're talking seconds, not minutes), for instance the new Kempston is quicker. However, its real power lies in its combination of direct access to streams and channels and its random access facilities; no other system has quite this combination.

Files are OPENed using the "M" channel just as with microdrives, and are similarly MOVEd to screen or printer through the on-board parallel interface to check contents; to get Tasword II to print, all you do is insert OPEN #3; "b" at the start of line 15.

As extensions to microdrive syntax, files are specified as IN or OUT; with EXP you can expand a file, and with POINT you can read randomly any item. This is extremely powerful in sorting data; for instance a dedicated database is currently being written which will store a dedicated database is currently being written which will store scientific references, recoverable at random, on the basis of authors, keywords, or of journal. So, 'what did Fred Bloggs publish on SUPERBASIC in ZX Computing?' is immediately answerable. The catalogue, itself a file, can be printed out, or even used as sort data prior to ERASEing automatically unwanted files.

I had thought of using Discovery with some of the Beta Basic routines, (for instance it will convert strings to all capitals, simplyfying subsequently sorting). Unfortunately, the program thinks there is an Interface I ROM there, and some parts (the error messages for a start), get screwed up. I am assured that a Discovery-compatible Beta Basic 3.0 will be on the market by the time this is in print.

Finally, readers might like to know that there is a Discovery user group, based in Holland, (for the system has sold well internationally): contact D. C. Kruithof, Boeierkade 6, 2725 CH Zoetermeer, The Netherlands. In short, Discovery is just what one might have expected of Company which already has a reputation for producing add-ons for other micros. I have found it versatile, workmanlike, absolutely reliable and strongly recommend it.

Readers can contact John Wase c/o Department of Chemical Engineering, University of Birmingham

Micro Music

This month we look at WHAM, no, not the group but Melbourne House's much vaunted program for the Spectrum.

Wham! The Music Box, is claimed to be the 'complete sound system for your Spectrum' and as such has a lot to live up to. The Spectrum has long been noted for its particularly pathetic sound facilities and, apart from a few exceptions — Romantic Robot's Music Typewriter for instance, programs which are based on this feature are doomed to failure. So what has MH produced to entice us?

The answer is a novel and adventurous way of producing (to all intents and purposes) TWO channel sound without any add-on units. No, I couldn't believe it either and loaded in the program with a large dose of scepticism.

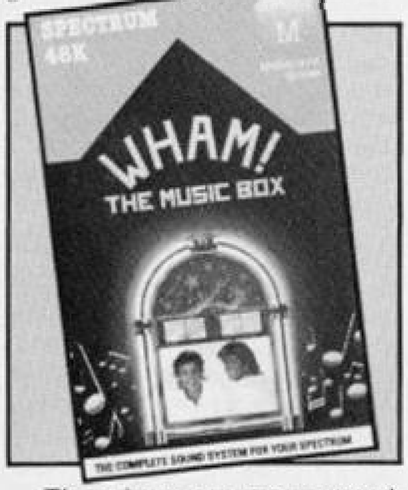
The program is supplied with five demonstration songs built in, all by Wham (the group) and very impressive they sound too — well, technically speaking anyway.

Volume is not very loud at the best of times and sound quality on the Spectrum has always been rather dubious, but it is true there *is* very definitely two channel sound and also, by very clever timing, a rhythmic percussion effect as well.

Even played on an unadorned Spectrum it's way ahead of anything else, but add a sound boost, such as Cheetah's or the Currah Microspeech or the SSL units which output the sound through the TV speaker — or even the DK Tronics amp, and you have a very respectable music machine.

On Test

At first I was concerned with the fact that the instructions only took up six sides of a cassette inlay. I like my instructions to be at idiot level and explained step by step. In fact they are a lesson in brevity and precision. They do use a step by step approach and very quickly and clearly introduce you to using the program.



There is no attempt to teach any music at all, the user is assumed to have a background knowledge or to be willing to experiment. The problem with experimenting is that you get things wrong and need to be continually changing them. The editing facilities of some other programs have been a serious problem but with WHAM you can delete back by one note at a time or overwrite selectively. This makes editing quick and simple.

When the program is first loaded you are faced with the 'main' options menu consisting of:

1. Load a tune.
2. Save a tune.
3. Hear the tune.
4. 'Whampile' the tune.
5. Set tempo.
6. Edit mode.
7. Help page.

All these except (4), are straightforward and I'll go into this one later.

From each of these options you are taken to a screen with its own set of controls and options. These are, on the whole, well prompted and easy to use, and a constant display of status is provided. Music is entered by using the keys CAPS SHIFT to SPACE as a piano keyboard and each press produces a semi-quaver on the staves. You have a range of four octaves which you select by pressing keys 1 to 4.

Notes longer than a semi-quaver are supposedly produced by repeating as many semi-quavers as are required to make up the note. These are played as separate notes to play a quick, staccatto semi-quaver trill. To get around this you have to be quite ingenious with the use of rests and tempo techniques.

Other keys which have functions are, (6) to return to the main menu, (7) to erase the whole tune, (9) rewind, (0) step back one note, (Q) replay tune, (W) set repeat marker, (E) bass drum effect, (R) restart, (T) toggle between channels 1 and 2, (O) fast forward, (P) play single note.

Percussion

Drum effects are possible from a simple synthesizer type section. Pressing E places a standard bass drum effect in the music and pressing 8 puts you into 'noise' creation.

Once in this option you have the choice of selecting between seven different waveforms and four durations, these are positioned in the music by the Y, U or I keys.

You have to be very clever indeed to use these options effectively as the Bass drum takes out one note from one channel and the noise takes up a note from both channels. As you can imagine, this can be very effective but you have to be extremely ingenious to use it to its full.

Whampile

This is one of the main reasons why some people will purchase this program. By using this option you can compile a tune in memory and save it to tape.

This saved version can be reloaded and run independently to WHAM and can be incorporated into your own programs to play either note by note as the program operates, or as a one off introduction piece.

This does for sound what the graphics utilities did for title screens or HURG did for DIY games. I am impressed, but I must say that as a serious tool for a musician or composer then it is not really of any real use. However, as a fun program it is brilliant. I took it to a school and let the pupils there try it and, although none had any musical knowledge, it fascinated and entertained them for hours. Finally, as a means of getting impressive sounds and music in your own programs it is invaluable, I may be mistaken, but I'm sure I heard WHAMPILED music in GYROSCOPE, Melbourne House's latest arcade game.

Machine Code Trace

Coventry's Carol Brooksbank wrote this utility to find bugs in her programs and she thought she'd share it with us.

I don't know about you, but I don't think that I have ever written a machine code program which ran perfectly first time. You know the feeling. Eagerly, you type in your latest masterpiece, enter RANDOMIZE USR something-or-other and **CRASH!** There you sit, with a frozen keyboard and only a blank screen or a pretty psychedelic pattern to look at. You have no idea whether there is a fault in the logic of your program, whether you have made a typing mistake or miscounted a displacement, and you don't know where to start looking for the trouble, because you do not know how far into the program the crash occurred. Well, help is at hand.

This machine code program will give you a hex trace at the right of the screen, as your program runs. It is only a partial trace, as it does not show the address of every instructions as it is executed — if it did, the display would change so fast that you would never be able to read it — but every 1/50 second it gives you the address that the program has reached. This is enough to let you keep an eye on the progress of your program, and to see where things start to go wrong. For instance, if the crash is caused by the program getting into an endless loop, you will see the same sequence of bytes repeated over and over again after the crash happens. If you left out a return instruction, so that the program starts running through the empty bytes above your program, that too will be obvious. But remember that the trouble is not always at the point where the crash happens. A wrong displacement instruction may be some way away from the point to which it directs the program. You will still have to think for yourself to decide why the program runs as it does.

Why is the display in hex? Two reasons. The first is purely personal. I wrote the program for myself in the first place, and I always work in hex, so a decimal display would not be very helpful. (One of these days I shall find myself asking the greengrocer for "0A pounds of potatoes, please".) The second reason is rather more important. There is a direct relationship between the binary form of a number — the bit pattern held in the registers — and the hex form, which makes the conversion between the two very straightforward. Converting an address to decimal would involve multiplying the high byte by 256, adding the low byte, then isolating the 5 digits one by one for printing, all of which would make the routine much more complicated. Since the trace routine is in the form of an interrupt subroutine, it is desirable that it should be as short and simple as possible.

The routine makes use of the fact that, whenever the Spectrum performs a subroutine, the return address is pushed onto the stack. On an interrupt subroutine, the return address is the program counter, the point reached in the main program. If we can retrieve this address from the stack and display it, we have a trace. Obviously, there are a lot of instructions performed in between the interrupts which are not displayed, but this is usually enough to let you see where a program takes a wrong turning. So, if your machine code program crashes, load in this routine with your own program — I am assuming that you always take the precaution of taping your programs before running them, just in case — enter RANDOMIZE USR 65271 (48K), 32503 (16K), run your program again, and all should be revealed.

Details

The program is explained by the notes in the listing, but there are one or two details which need more explanation. The interrupt subroutine starts by saving the present value of HL in the two spare bytes in the system variables area at 5CB0. This is necessary because the existing values of registers must always be saved at the start of an interrupt subroutine, and if we push it onto the stack, it will cover up the address we are trying to retrieve. The address is then POPped from the stack in HL, PUSHed back again so that it is in its correct place when the return is made from the subroutine, and the other register values can then be saved on the stack. The other spare byte among the system variables, 5C81, is used as an interrupt counter. If this has reached 22d, the printing position is set to the top of the screen and the counter reset to 0. Otherwise, the routine jumps forward to print the address.

The print subroutine starts with the instruction AND 0F, which has the effext of resetting bits 4-7 of the A register, leaving bits 0-3 unchanged, isolating the number we wish to print. PRINT must be called, therefore, with the number to be printed in bits 0-3 of A. If the number to be printed is the "left hand" digit of the two in the A register, the instruction RRA is performed 4 times, to move it to the "right-hand" position, but the print subroutine is called directly when the "right-hand" digit it to be printed. When PRINT is called, the DE register holds the first byte of the screen position for the digit, and at the end of the PRINT subroutine, DE is restored to that position.

Since there are only 16 digits which we shall need to print, 0-9 and A-F, a table is set up, starting at FED7 (7ED7 16K), which holds the start addresses of the bit patterns of those digits in the ROM character table. Doubling the value of the number to print and adding it to the address of our table, points to the correct place in the table to retrieve the ROM address for that character. The digit can then be printed. After the 4 digits have been printed, the program variable SCRP at FF13 (7F13) is pointed to the next screen row down, and the program exits via the normal interrupt subroutine.

The listing is for the 48K machine. 16K folk should change the initial "F" in the addresses to "7", each CALL PRINT instruction should read CDB97E, and the bytes at 7EBD, which point to HL to the start of the table should be 21D77E. At START, the high byte of the interrupt vector address should be 28, giving the bytes 3E28. The interrupt vector address is not required at 7EFF, so the four bytes between 7EFD and 7F01 may be changed to NOP if you wish, though if they are left as they are the program will simply ignore them.

Saving

To SAVE the routine on tape:

SAVE "m/c trace" CODE 65116, 184 (48K)
SAVE "m/c trace" CODE 32348, 184 (16K)

To START the trace:

RANDOMIZE USR 65271 (48K)
RANDOMIZE USR 32503 (16K)

To STOP the trace:

RANDOMIZE USR 65292 (48K)
RANDOMIZE USR 32524 (16K)

Finally, remember that the trace will not work if the interrupts are disabled. You must change your DI and EI instructions to NOP while using the trace, and restore them when you have corrected your problems. ▶

MACHINE CODE TRACE PROGRAM LISTING

ADD.	M/CODE	LABEL	ASSEMBLY	NOTES
FE5C	22B05C	INT S/R	LD(5CB0),HL	Save present value of HL
FE5F	E1		POP HL	Fetch program counter
FE60	E5		PUSH HL	Save it again
FE61	F5		PUSH AF	Save
FE62	C5		PUSH BC	all
FE63	D5		PUSH DE	registers
FE64	3A815C		LD A,(5C81)	Fetch program counter
FE67	3C		INC A	update and
FE68	32815C		LD(5C81),A	store it again
FE6B	FE16		CP 16	Has counter reached 22d?
FE6D	200B		JRNZ CONT	Jump forward if not
FE6F	111C40		LD DE,401C	Set variable to
FE72	ED5313FF		LD(SCRP),DE	first screen position
FE76	AF		XOR A	Set counter
FE77	32815C		LD(5C81),A	to 0
FE7A	ED5B13FF	CONT	LD DE,(SCRP)	Fetch current screen position
FE7E	7C		LD A,H	Fetch first two digits
FE7F	1F		RRA	First digit
FE80	1F		RRA	to bits
FE81	1F		RRA	0 - 3
FE82	1F		RRA	of A register
FE83	CDB9FE		CALL PRINT	Print first digit
FE86	13		INC DE	Point to next screen position
FE87	7C		LD A,H	Fetch second digit
FE88	CDB9FE		CALL PRINT	Print second digit
FE8B	13		INC DE	Next screen position
FE8C	7D		LD A,L	Fetch last two digits
FE8D	1F		RRA	Third digit
FE8E	1F		RRA	to bits
FE8F	1F		RRA	0 - 3
FE90	1F		RRA	of A register
FE91	CDB9FE		CALL PRINT	Print third digit
FE94	13		INC DE	Next screen position
FE95	7D		LD A,L	Fetch last digit
FE96	CDB9FE		CALL PRINT	Print last digit
FE99	2A13FF		LD HL,(SCRP)	Fetch current screen position
FE9C	CB1C		RR H	Point HL
FE9E	CB1C		RR H	to next
FEA0	CB1C		RR H	screen row
FEA2	012000		LD BC,0020	down
FEA5	ED4A		ADD HL,BC	
FEA7	CB14		RL H	
FEA9	CB14		RL H	
FEAB	CB14		RL H	
FEAD	2213FF		LD(SCRP),HL	Save new screen position
FEB0	D1		POP DE	Restore
FEB1	C1		POP BC	all
FEB2	F1		POP AF	registers
FEB3	2AB05C		LD HL,(5CB0)	Restore HL
FEB6	C33800		JP0038	Exit via normal interrupt s/r
FEB9	E60F	PRINT	AND 0F	Isolate number to print
FEBB	87		ADD A,A	Double it
FEBC	E5		PUSH HL	Save program counter
FEBD	21D7FE		LD HL,FED7	Start of table to HL
FEC0	0600		LD B,00	Displacement to
FEC2	4F		LD C,A	BC
FEC3	09		ADD HL,BC	Add to start of table
FEC4	46		LD B,(HL)	Fetch ROM
FEC5	23		INC HL	character table
FEC6	4E		LD C,(HL)	address for digit
FEC7	C5		PUSH BC	and transfer to
FEC8	E1		POP HL	HL
FEC9	0608		LD B,08	Counter of bytes to print
FECB	7E	RPT	LD A,(HL)	Fetch byte to print
FECC	12		LD(DE),A	Print it
FECD	23		INC HL	Point to next character byte
FECE	14		INC D	Point to next screen byte
FECF	10FA		DJNZ RPT	Jump back unless 8 bytes printed
FED1	7A		LD A,D	Restore DE
FED2	D608		SUB 08	to screen position

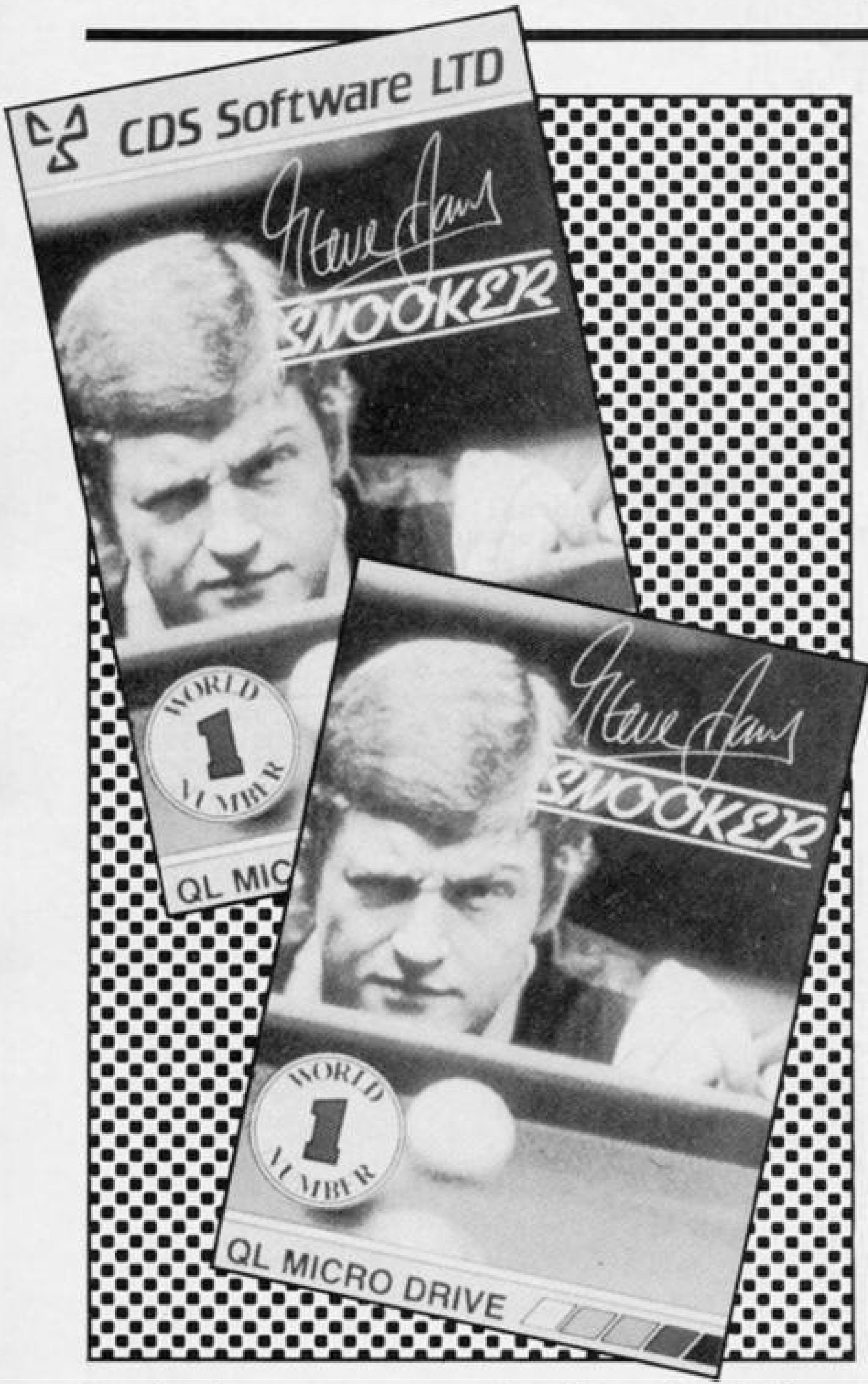
```
FED4 57                         LD D,A          for digit 1
FED5 E1                         POP HL          Fetch program counter
FED6 C9                         RET             Exit subroutine
FED7 3DB0       TABLE           DEFB
FED9 3D88                       DEFB
FEDB 3D90                       DEFB
FEDD 3D98                       DEFB
FEDF 3DA0                       DEFB
FEE1 3DA8                       DEFB
FEE3 3DB0                       DEFB
FEE5 3DB8                       DEFB
FEE7 3DC0                       DEFB
FEE9 3DC8                       DEFB
FEEB 3E08                       DEFB
FEED 3E10                       DEFB
FEEF 3E18                       DEFB
FEF1 3E20                       DEFB
FEF3 3E28                       DEFB
FEF5 3E30                       DEFB
FEF7 211C40     START           LD HL,401C      Store first
FEFA 2213FF                     LD(SCRP),HL     screen position
FEFD 1802                       JR PASS         By-pass
FEFF 5CFE                       DEFB            interrupt vector address
FF01 AF         PASS            XOR A           Set interrupt counter
FF02 32815C                     LD(5C81),A      to 0
FF05 3EFE                       LD A,FE         High byte of interrupt
FF07 ED47                       LD I,A          vector address to I register
FF09 ED5E                       IM2             Select interrupt mode 2
FF0B C9                         RET             Return
FF0C ED56       STOP            IM1             Select normal interrupt mode
FF0E 3E3F                       LD A,3F         Normal interrupt value
FF10 ED47                       LD I,A          to I register
FF12 C9                         RET             Return
FF13 0000       SCRP            DEFB            Program variable
```

```
15F8
15E2
10B4
1620
15EC
15E6
15FF
10AF
15F8
15E8
15E1
10AF
15F8
15E8
15E1
10AF
15F8
0E5C
15F8
15E8
15E1
10AF
```

SCREEN DUMP OF MACHINE CODE TRACE DISPLAY

QL Soft

Damian Clay takes a look at more new games for the QL.



Fantasia Adventure S.B. Software £8.50

This program is a text adventure set in a series of scenes. The player takes on the role of a spy in a hostile country under the absolute rule of the emperor. Your mission is in two parts: to recapture some of the sacred treasures looted from your country and to assassinate the emperor who is oppressing your people.

There is not much in the way of graphics, and both sound and colour are very limited, but then they are not really needed in an adventure program. The text is set out in three windows, two which tell you your location and objects and one for input.

It is very easy to backup as there is a backup program on the cartridge which is run separately from the master cartridge. It is easy to use, all you have to do is place the master in mdvi and your blank cartridge in mdv2 and run the backup program.

Playing is very simple but it is very easy to get lost unless you keep a map of your movements. Commands are also very simple and can be easily remembered. It is presented very well although there are no onscreen instructions and the written ones are two typed sheets of A4, but they explain the game and how to play it very well.

It is quite a good game overall and is a very good game for adventure lovers, atmosphere is well created and some of the problems are quite difficult.

GRAPHICS	NA
ADDICTIVENESS	* * * *
OVERALL	* * *

Steve Davis Snooker CDS £14.95

This game is a computer simulation of the game of snooker where you can play either the computer, another opponent, or the computer can play itself.

The graphics are excellent and they make it look very much like a real table. Use of colour is also very good and compliment the graphics, however black is represented by a green with a pink centre and the brown by a green with a red centre. Sound is fairly well used and sounds quite good.

Making a backup is easy if you know a little about copying from one microdrive to another or disk, because unfortunately there is no backup program on the cartridge which could cause problems.

There is no high score routine as such but there is a high break table which is a fairly good idea. Playing is quite simple with very good onscreen prompts and easy to understand instructions. The only really hard parts are selecting your spin and your power, but when you get used to it it becomes more easy to judge.

Overall it is an excellent game and is worth every penny, well written and is well worth adding to your collection.

GRAPHICS	* * * * *
ADDICTIVENESS	* * * *
OVERALL	* * * * *

QL Blackjack Quest

This game is a computer card game simulation of the English casino version of Blackjack (pontoon), where the object of the game is to get a blackjack or as near to 21 as possible.

You start the game by signing a cheque for £100 which is your money to use to bet on your cards. After you have signed your cheque you start to play.

First you place your bet, then it displays both of your cards face up and the computer's cards one face up and one face down. It is your turn first, and you can HIT (twist), DOUBLE or STICK. If you have two cards of equal value the computer asks if you would like to split. After you have had your turn it is the computer's and it has to try to better your score. Unfortunately the game does not accept five card tricks or allow you to 'burn' on fourteen.

The graphics are very good and the cards look nearly real. Use of colour is also good, and sound, though limited, is fairly realistic.

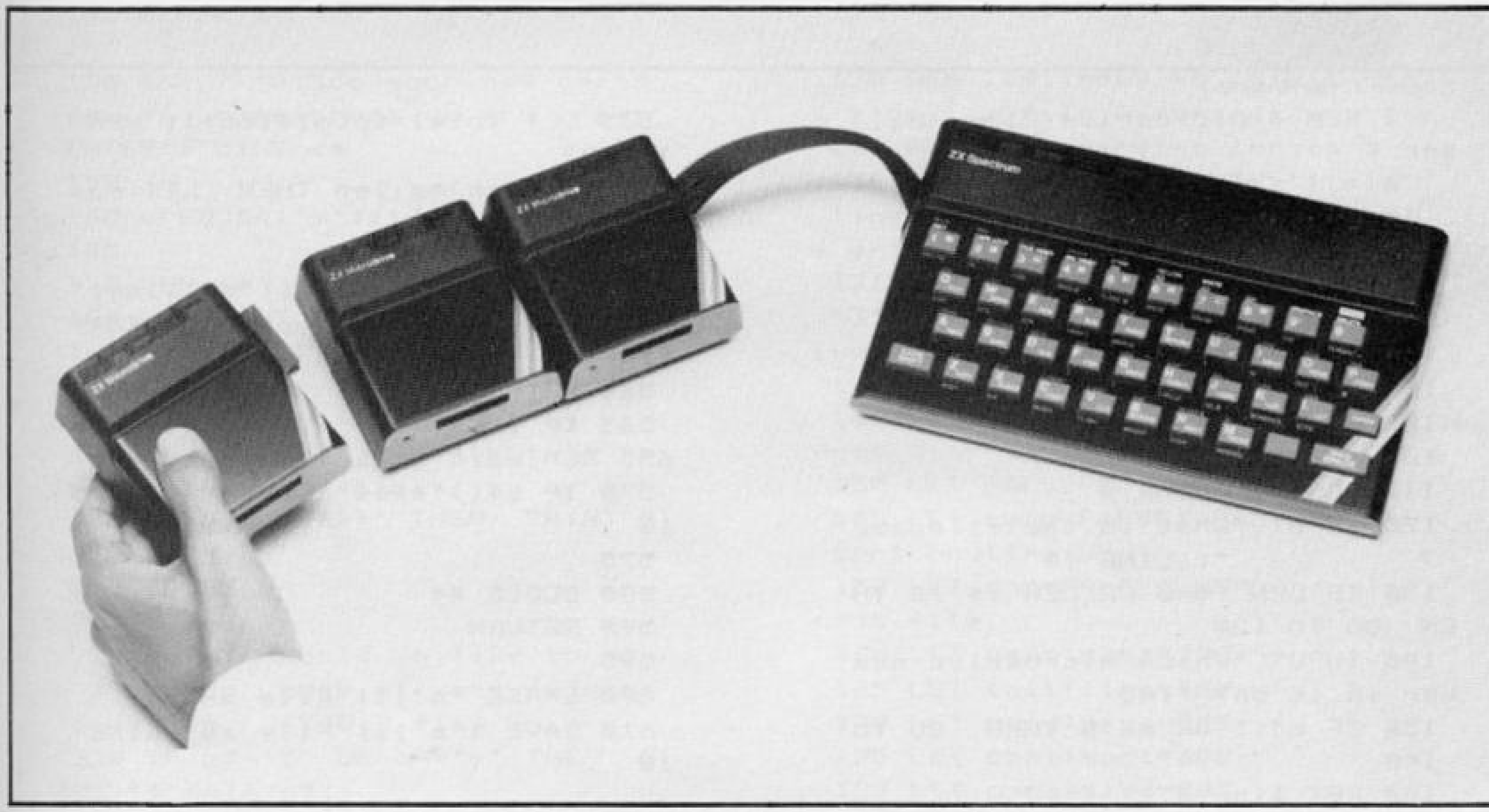
The game is very well presented although the instructions are a typed sheet of blue A4 paper, but these give you instructions on how to use the game and a very brief introduction to the actual game of blackjack.

Overall it is a very good game and is well worth adding to your collection.

GRAPHICS	* * * * *
ADDICTIVENESS	* * * *
OVERALL	* * * * *

Microdrive File Utility Suite

W.F. Barnard of Oxon helps to get us organised with three useful programs for use with files.



"We'd like to know a bit about you for our files" said Simon and Garfunkle to Mrs Robinson. She needn't have worried if they were kept on a microdrive as they are bound to get lost or confused.

But, now we have this suite of programs to enable microdrive owners to get some order and organisation in their system, three in all and they perform the following tasks:

1) FILE ANALYSER

This program prompts for the name of a file and which microdrive it is on. It then reads through the file displaying information about each line and then the line itself. The information is of the form:

Line number, Line length, Maximum line length so far, and the Total number of bytes in the file so far.

The listing can be halted for viewing by pressing any key. It is assumed that the last line of the file is four stars i.e. '★★★★'

2) FILE COPIER

With only one microdrive it is not easy to make copies of data files onto other cartridges. This program will make a copy of a microdrive file to another cartidge using only one microdrive. The size of the file is limited by the amount of memory available in the computer.

The program prompts for the filename, the number of lines in the file and the length of the longest line in the file. If any of this information is not known then the file should be first read by my File Analyser. If the last line of the file is not '★★★★' then this is added for future use. A facility is also included to make a copy of this file to cassette. This is sometimes known as archiving.

FILE SORTER

This program allows microdrive files of up to 90K to be sorted into alphabetical order. The size of the file that can be sorted depends on how many microdrives you have. Assuming that a full 90K is available on your cartridges then with one microdrive a file of 30K can be sorted, with two microdrives a file of 45K, and with three microdrives a file of 90K.

The program uses two temporary files during my sort and merge algorithm. The last line of the file again should be '★★★★'. The program will take some minutes to sort a large file so it tells you roughly what it is doing whilst executing.

The program reads so many lines from the main file into an array and then sorts these into order. It then merges this array with one of the temporary files into the other temporary file. This continues until the end of the main file. The number of lines that are read from the main file and sorted is selected by the user. This value together with the length of the longest line should be as large as the computer's memory allows.



Program 1. File Analyser.

```
   2 REM * Microdrive File Analy
ser *
   6
  10 GO SUB 100: REM init
  20 GO SUB analyse
  30 STOP
  99
 100 REM ********
 101 REM * Init *
 102 REM ********
 103
 110 CLS #: CLEAR #
 120 INPUT "What is the filename
 ?              "; LINE f$
 130 IF LEN f$=0 OR LEN f$>10 TH
EN  GO TO 120
 140 INPUT "Which microdrive num
ber is it on? ";md
 150 IF md<1 OR md>8 THEN  GO TO
 140
 160 LET line=0
 165 LET total=0
 170 LET maxlen=0
 180 LET analyse=500
 190 OPEN #4;"m";md;f$
 200 RETURN
 499
 500 REM **********************
****************************
 501 REM * Analyse file. This ro
utine will end in EOF error *
 502 REM * unless the last line
of the file is ****          *
 503 REM **********************
****************************
 504
 510 INPUT #4; LINE a$
 520 LET line=line+i
 530 LET len=LEN a$
 535 LET total=total+len+1: REM
1=<CR>
 540 IF len>maxlen THEN  LET max
len=len
 545 POKE 23692,0
 550 PRINT  INVERSE 1;"#";line;"
 Len=";len;" Max=";maxlen;" Tot=
";total
 560 PRINT a$
 565 IF INKEY$<>"" THEN  GO TO 5
65: REM wait if key pressed
 570 IF a$<>"****" THEN  GO TO 5
10
 575
 580 CLOSE #4
 590 RETURN
 595
 600 ERASE "m";1;"File an"
 610 SAVE *"m";1;"File an" LINE
10
```

Program 2. Datafile.

```
  11 REM * Copy Microdrive Data
File *
  12 REM * Using Only 1 Drive.
     *
  14 REM If 2 drives are availab
le then use the MOVE command.
  16 REM * MOVE "m";1;"Original"
 TO "m";2;"Copy" *
  19
  20 CLS #: CLEAR #
  30 INPUT "What is the filename
? "; LINE f$
  50 INPUT "How many lines in th
e file? ";lin
  60 INPUT "What is the length o
```

```
f the        longest line? ";len
  65
  69 REM may fail here if file t
oo large to hold in memory
  70 DIM a$(lin,len+3)
  75
  80 OPEN #4;"m";1;f$
  85
  90 FOR i=1 TO lin
 100     INPUT #4; LINE b$
 110     LET a$(i)=b$
 120     LET a$(i,len+1 TO )=STR$
 LEN b$
 130 NEXT i
 135
 140 CLOSE #4
 145
 150 INPUT "Place your new cartr
idge in yourmicrodrive and press
 ENTER"; LINE c$
 155
 160 OPEN #4;"m";1;f$
 165
 170 FOR i=1 TO lin
 180     PRINT #4;a$(i, TO VAL a$
(i,len+1 TO ))
 190 NEXT i
 195
 199 REM if last line in file no
t **** then add it.
 200 IF b$<>"****" THEN  PRINT #
4;"****"
 210 CLOSE #4
 215
 220 INPUT "Would yo like to mak
e a backup  copy of your file on
 cassette   (Y/N)? ";b$
 230 IF b$="Y" OR b$="y" THEN  S
AVE f$ DATA a$()
 235
 240 STOP
 999
1000 ERASE "m";1;"Copy file"
1010 SAVE *"m";1;"Copy file" LIN
E 10
```

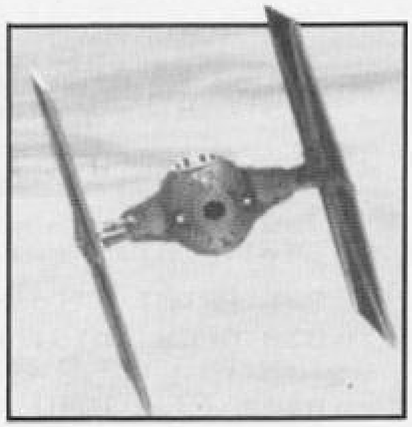
Program 3. File Sorter.

```
  11 REM * Microdrive File Sorte
r *
  15
  20 GO SUB 100: REM init
  30 GO SUB userinput
  40 GO SUB initfiles
  45
  50 GO SUB readlines
  55 GO SUB shellsort
  60 GO SUB openfiles
  65 GO SUB merge
  70 GO SUB closefiles
  75 IF NOT end THEN  GO TO 50
  80
  85 GO SUB finishoff
  90 GO TO 9999
  99
 100 REM ********
 101 REM * Init *
 102 REM ********
 103
 110 CLEAR #: CLS #
 115 PRINT AT 0,5;"Microdrive Fi
le Sorter"
 120 PRINT AT 1,8;"W.F.Barnard B
.Sc."
 125 PRINT AT 2,11;"April 1984"
 126
 128 REM limit=max no. lines rea
d from i/p file & sorted
 129 REM len=max line length
 130 REM a$(limit,len+3)='limit'
 lines of 'len' chars (+3 to hol
d original length)
 131
 135 DIM f$(3,11): REM 3 microdr
ive no.s + filenames
 140 LET b$="": REM input line
 145 LET TRUE=1: REM Boolean val
ues
 150 LET FALSE=0
 155 LET swap=FALSE: REM used in
 sort routine
 157 LET end=FALSE: REM end of i
nput file.
 160 LET userinput=250
 165 LET initfiles=400
 170 LET readlines=500
 175 LET shellsort=600
 180 LET openfiles=800
 195 LET merge=900
 200 LET closefiles=1100
 202 LET filename=1300
 205 LET finishoff=1200
 206 LET old=5: LET new=6: REM s
tream no.s
 210 RETURN
 249
 250 REM **************
 251 REM * User input *
 252 REM **************
 253
 255 PRINT '"Please type in the
name of your file to be sorted i
n the form:-"
 260 PRINT '"1fred"
 265 PRINT '"where 1 is the micr
odrive numberand 'fred' is the f
```

```
ilename."
 270 GO SUB filename
 271 PRINT '"Main file = ";b$
 272 LET f$(1)=b$
 274 PRINT '"How many lines to b
e read and   sorted at a time?"
 275 INPUT limit
 276 PRINT '"What is the length
of the       longest line in you
r file?"
 277 INPUT len: IF len<1 THEN  G
O TO 276
 278 DIM a$(limit,len+3)
 279
 280 PRINT '"Please type in the
names of 2   files, in the same
format as    above, that can be
used for     output."
 285 GO SUB filename
 286 PRINT '"Temporary File 1 =
";b$
 290 LET f$(2)=b$
 295 GO SUB filename
 296 PRINT "Temporary File 2 = "
;b$
 300 LET f$(3)=b$
 305
 310 IF f$(1)=f$(2) OR f$(2)=f$(
3) OR f$(1)=f$(3) THEN  PRINT '"
Sorry, you can't have the same
filenames for input and output!"
: GO TO 250
 350 LET o$=f$(3): REM oldfile
 355 LET n$=f$(2): REM newfile
 360 RETURN
 399
 400 REM **************
 401 REM * Init files *
 402 REM **************
 403
 410 PRINT '"Initialising files"
 415 PRINT '"Opening main file"
 420 OPEN #4;"m";VAL f$(1,1);f$(
1,2 TO ): REM main file
 421
 425 PRINT '"Creating newfile"
 430 OPEN #new;"m";VAL n$(1);n$(
2 TO ): REM create newfile
 440 PRINT #new;"****": REM with
 file terminator
 450 CLOSE #new
 460 RETURN
 499
 500 REM ***********************
******
 501 REM * Read lines from main
file *
 502 REM ***********************
******
 503
 504 POKE 23692,0: REM auto scro
ll
 505 PRINT '"Reading main file"
 510 LET count=0
 515
 520 INPUT #4; LINE b$
 530 IF b$="****" THEN  LET end=
TRUE: RETURN
 540 LET count=count+1
 550 LET a$(count)=b$
 560 LET a$(count,len+1 TO )=STR
$ LEN b$
 570 IF count<>limit THEN  GO TO
 520
 575
 580 RETURN
 599
 600 REM ******************
 601 REM * Shell sort a$() *
 602 REM ******************
 603
 605 PRINT '"Sorting"
 610 IF count<2 THEN  RETURN
 615 LET shl=1
 620 IF shl<count THEN  LET shl=
shl*2: GO TO 620
 625
 630 LET shl=shl/2
 635
 640 LET swap=FALSE
 645
 650 FOR i=1 TO count-shl
 660      IF a$(i)<=a$(i+shl) THEN
  GO TO 690
 670      LET b$=a$(i): LET a$(i)=
a$(i+shl)
 680      LET a$(i+shl)=b$: LET sw
ap=TRUE
 690 NEXT i
 695
 700 IF swap THEN  GO TO 640
 705
 710 IF shl<>1 THEN  GO TO 630
 715
 720 RETURN
 799
 800 REM **********************
*
 801 REM * Open new & old files
*
 802 REM **********************
*
 803
 810 IF count=0 THEN  RETURN
```

```
 811
 815 REM swap new & old filename
s
 82Ø LET b$=o$: LET o$=n$: LET n
$=b$
 821
 825 PRINT '"Opening old file"
 83Ø OPEN #old;"m";VAL o$(1);o$(
2 TO )
 831
 835 PRINT '"Opening new file"
 84Ø OPEN #new;"m";VAL n$(1);n$(
2 TO )
 85Ø RETURN
 899
 9ØØ REM ***********************
****************
 9Ø1 REM * Merge a$() with oldfi
le into newfile *
 9Ø2 REM ***********************
****************
 9Ø3
 9Ø5 PRINT '"Merging"
 91Ø IF count=Ø THEN  RETURN
 92Ø LET ptr=1: REM pointer into
 a$()
 925
 93Ø INPUT #old; LINE b$
 94Ø IF b$="****" THEN  GO TO 1Ø
ØØ
 945
 95Ø IF ptr>count THEN  GO TO 1Ø
5Ø
 96Ø IF b$<=a$(ptr, TO len) THEN
 PRINT #new;b$: GO TO 93Ø
 97Ø PRINT #new;a$(ptr, TO VAL a
$(ptr,len+1 TO ))
 98Ø LET ptr=ptr+1
 99Ø GO TO 95Ø
 995
1ØØØ REM End of old file - write
 rest of a$() to newfile.
1ØØ5
1Ø1Ø FOR i=ptr TO count
1Ø2Ø     PRINT #new;a$(i, TO VAL
a$(i,len+1 TO ))
1Ø3Ø NEXT i
1Ø35
1Ø4Ø RETURN
1Ø45
1Ø5Ø REM End of a$() - copy rest
 of oldfile to newfile.
1Ø55
1Ø6Ø PRINT #new;b$
1Ø7Ø INPUT #old; LINE b$
1Ø8Ø IF b$<>"****" THEN  GO TO 1
Ø6Ø
1Ø85
1Ø9Ø RETURN
1Ø99
11ØØ REM ***********************
**
11Ø1 REM * Close new & old files
 *
11Ø2 REM ***********************
**
11Ø3
111Ø IF count=Ø THEN  RETURN
112Ø PRINT #new;"****": REM term
inator
113Ø CLOSE #new
114Ø CLOSE #old
1141
1145 PRINT '"Erasing old file"
115Ø ERASE "m";VAL o$(1);o$(2 TO
 )
116Ø RETURN
1199
12ØØ REM **************
12Ø1 REM * Finish off *
12Ø2 REM **************
12Ø3
121Ø CLOSE #4: REM main file
122Ø CLEAR #: CLS #
1225
123Ø PRINT "Your file"'f$(1,2 TO
 )'"on microdrive ";f$(1,1)
124Ø PRINT '"is now sorted in th
e file"
125Ø PRINT n$(2 TO )'"on microdr
ive ";n$(1)
126Ø RETURN
1299
13ØØ REM ***********************
*******
13Ø1 REM * Get filename in form
1fred *
13Ø2 REM * where 1 is microdrive
 no.   *
13Ø3 REM * and 'fred' is the fil
ename *
13Ø4 REM ***********************
*******
13Ø5
131Ø INPUT  LINE b$
132Ø IF LEN b$<2 OR LEN b$>11 TH
EN  GO TO 131Ø
133Ø IF b$(1)<"1" OR b$(1)>"8" T
HEN  GO TO 131Ø
134Ø RETURN
1399
14ØØ ERASE "m";1;"Sorter"
141Ø SAVE *"m";1;"Sorter" LINE 1
Ø
```

Starfighter



Han Crielard has been stargazing in the Netherlands and invites all budding space pilots to try shooting them!

The object of the game is to shoot at the stars (inverse '★') which grow up. If there are four stars above each other, you lose a life. Your task is to prevent such a group of four stars forming. You shoot at the stars, and if you hit them, they are destroyed, but not for long. The game ends when you have run out of lives (you begin with three). If you beat the high score you can enter your name (up to thirteen characters), and at the end of the game the following options are displayed:

Press 1 for instructions.
Press 2 to play again.

Pressing '1' or '2' will give the appropriate response. You gain an extra life upon reaching 2000 points.

The program is divided into two parts, BASIC and machine code. The machine code prints the score in inverse characters at the top left of the screen, and increments it by ten points at a time.

First, type in the machine code loader and RUN it. The computer will display a series of memory address and ask you to INPUT some numbers. These are given in the disassembly listing (figure 1). Then type in the BASIC listing and you are ready to start.

The graphics characters in line 310 are the graphics characters on the 'A' key.
To SAVE the game, type GOTO 9000. The game will SAVE itself, and then RUN.

If you find that the score needed to gain an extra life is too high, then alter line 830 as required.

Figure 1. Disassembly listing.

MACHINE DISASSEMBLY

LABELS	ADDRESS	ASSEMBLER	DECIMAL
SET UP	16514	NOP	ø
	16515	NOP	ø
	16516	LD HL,(D-FILE)	42 12 64
	16519	LD DE,512	17 ø 2
	16522	ADD HL,DE	25
	16523	LD (16514),HL	34 13ø 64
SCORE	16526	LD HL,(D-FILE)	42 12 64
	16529	LD DE,12	17 12 ø
	16532	ADD HL,DE	25
	16533	LD A,(HL)	126
	16534	INC A	6ø
	16535	CP 166	254 166
	16537	JR NZ 5	32 5
	16539	LD (HL),156	54 156
	16541	DEC HL	43
	16542	JR 245	24 245
	16544	LD (HL),A	119
	16545	RET	2ø1

BASIC listing.

Line(s)

1	machine code.
10-90	makes the screen black, and sets up variables
99-210	print the instructions on the screen.
220-390	print the same screen.
399-460	variables used in the shoot routine.
470-480	start key routine.
489-840	main program.
999-1040	move spaceship left.
1999-2040	move spaceship right.
2999-3230	spaceship's shoot routine.
3999-4210	'lost life' routine
4999-5060	print lives on screen.
5999-7530	game over routine, and print instructions.
7999-8300	input name and high-score.
8499-8610	extra life routine.
8999-9030	SAVE routine.

Machine code loader.

```
1 REM XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
10 SCROLL
20 FOR X=16514 TO 16545
30 PRINT X;" ";
40 INPUT A
50 POKE X,A
60 PRINT A
70 SCROLL
80 NEXT X
```

```
   1 REM W?E£RND)  ";6 RNDE£RND)£
;Q F/ PRINT ?TAN  :<:XXX
  10 POKE 16418,0
  20 LET B$="                                "
  50 LET H$="00000"
  60 LET HI=0
  70 LET I$="***************"
  99 REM INTRO
 100 GOSUB 1000
 105 PRINT AT 2,10;"-----------";TAB 10;"STARFIGHTER";TAB 10;"-----------"
 110 PRINT AT 6,5;"YOU ARE A SPACESHIP (S)";AT 7,5;"THAT CAN SHOOT AT THE"
```

```
 120 PRINT AT 8,5;"STARS [illegible] IF
 THERE ARE 4 ";AT 9,5;"STARS ABOV
E EACH OTHER"
 130 PRINT AT 10,5;"THEN YOU HAV
E LOST.";AT 11,5;"A 2000 POINTS
 ONE";AT 12,5;"EXTRA LIFE."
 140 PRINT AT 14,5;"[illegible] Z=MOV
E LEFT";AT 15,5;"----";AT 15,12;
"X=MOVE RIGHT";AT 16,12;"M=SCHOO
T"
 150 PRINT AT 18,5;"HIGH SCORE:"
;H$
 160 PRINT AT 20,5;"BY";AT 20,8;
I$
 200 PRINT AT 23,4;"PRESS ANY KE
Y TO START."
 210 IF INKEY$="" THEN GOTO 210
 220 LET SC=0
 230 LET LV=3
 240 LET V$="3"
 250 GOSUB 1000
 300 PRINT AT 3,10;"STARFIGHTER"
;TAB 10;"-----------"
 310 PRINT AT 8,10;"▒▒▒▒▒▒▒▒▒▒▒"
;AT 14,10;"▒▒▒▒▒▒▒▒▒▒▒"
 320 PRINT AT 9,15;"█"
 330 PRINT AT 16,12;"READY  "
 340 PRINT AT 18,8;"PRESS M TO S
TART"
 350 PRINT AT 8,23;"LIVES:";V$
 360 PRINT AT 20,5;"HIGH SCORE:"
;H$;AT 22,5;"BY";AT 22,8;I$
 370 PRINT AT 0,2;"SCORE 00000"
 399 REM SET UP
 400 DIM P(11)
 455 LET D=15
 470 IF INKEY$<>"M" THEN GOTO 47
0
 489 REM MAIN PROGRAM
 490 PRINT AT 16,0;B$;AT 18,0;B$
 500 LET A=USR 16516
 510 LET SC=SC+10
 520 LET D$=INKEY$
 530 LET D=D-(INKEY$="Z" AND D>1
0)+(INKEY$="X" AND D<20)
 540 PRINT AT 9,D-1;" █ "
 550 IF D$="M" THEN GOSUB 3000
 600 LET F=INT (RND*11)+10
 610 LET B=INT (RND*4)+10
 620 IF PEEK (PEEK 16396+256*PEE
K 16397+B*33+F+1)=151 THEN GOTO
600
 650 PRINT AT B,F;"*"
 700 LET P(F-9)=P(F-9)+1
 710 IF P(F-9)=4 THEN GOTO 4000
 800 LET A=USR 16526
 820 LET SC=SC+10
 830 IF SC=2000 THEN GOSUB 8500
 840 GOTO 520
1000 FOR A=0 TO 23
1010 PRINT AT A,0;B$
1020 NEXT A
1030 RETURN
2000 FOR M=9 TO 13
2010 PRINT AT M,0;B$
2020 NEXT M
2030 PRINT AT 16,0;B$;B$
2040 RETURN
2999 REM SHOOT
3000 FOR Z=10 TO 13
3010 PRINT AT Z,D;"█"
3020 NEXT Z
3200 FOR X=10 TO 13
3210 PRINT AT X,D;"█"
3220 NEXT X
3225 LET P(D-9)=0
3230 RETURN
3999 REM LIVE LOST
4000 LET LV=LV-1
4010 IF LV>0 THEN PRINT AT 16,9;
"ONE LIFE LOST"
4020 IF LV=0 THEN GOTO 6000
4030 GOSUB 5000
4040 FOR V=0 TO 50
4050 NEXT V
4060 DIM P(11)
4070 LET D=15
4100 GOSUB 2000
4200 PRINT AT 9,D;"█"
4210 GOTO 520
4999 REM PRINT LIVES
5000 LET V$=CHR$ (LV+156)
5050 PRINT AT 8,29;V$
5060 RETURN
5999 REM GAME OVER
6000 FOR U=0 TO 20
6010 PRINT AT 11,1;"██████████"
6020 FOR B=0 TO 1
6030 NEXT B
6040 PRINT AT 11,1;"GAME OVER"
6050 NEXT U
6060 GOSUB 5000
7000 IF SC>HI THEN GOSUB 8000
7010 PRINT AT 16,0;B$;B$
7020 PRINT AT 16,3;"PRESS 1 FO
R INSTRUCTIONS."
7030 PRINT AT 17,3;"PRESS 2 TO
 PLAY AGAIN."
7040 LET LV=3
7050 LET SC=0
7060 GOTO 7060-(6960 AND INKEY$=
"1")+(40 AND INKEY$="2")
7100 GOSUB 2000
7160 LET V$="3"
7170 GOTO 320
7999 REM INPUT NAME/HIGH SCORE
8000 PRINT AT 16,5;"YOU HAVE THE
 HIGH SCORE";AT 17,5;"ENTER YOUR
 NAME."
8020 POKE 16418,2
8060 INPUT I$
8070 IF LEN I$>13 THEN GOTO 8060
8080 FOR H=1 TO LEN I$
8100 LET L=CODE I$(H)
8110 IF L<129 THEN LET I$(H)=CHR
$ (L+128)
8120 IF L>128 THEN LET I$(H)=CHR
$ (L-128)
8130 NEXT H
8140 POKE 16418,0
8150 PRINT AT 22,0;B$;B$
8200 LET HI=SC
8210 LET J$=STR$ HI
8220 LET H$=H$( TO 5-LEN J$)
8230 FOR X=1 TO LEN J$
8240 LET H$=H$+CHR$ (CODE J$(X)+
128)
8250 NEXT X
8260 PRINT AT 20,16;H$
8270 PRINT AT 22,5;"BY";AT 22,8;
I$
8300 RETURN
8499 REM EXTRA LIFE
8500 FOR G=1 TO 20
8510 PRINT AT 16,10;B$( TO 10)
8520 LET R=RND*RND
8540 PRINT AT 16,10;"EXTRA LIFE"
8550 NEXT G
8560 LET LV=LV+1
8570 GOSUB 5000
8580 FOR L=1 TO 10
8590 NEXT L
8600 PRINT AT 16,10;B$( TO 10)
8610 RETURN
9000 SAVE "STARFIGHTER"
9010 CLS
9020 SLOW
9030 RUN
```

Train Race

Train yourself to be better with the times tables. Clyde Bish comes to you inter-city from Exeter.



A great program with which to practise your tables, with a cute line in graphics. The techniques which make this different from the run of the mill multiplication tester programs are that the answer is given so the multiplier is needed, and the time limit for the player is obtained from a test at the start.

Coupled with Clyde's tight programming techniques and use of the Horizon "Big Print" routine, all in all a program from which everyone could learn.

The scenario is a race between two trains to the end of the track. A correct response moves the player's train (with appropriate graphic and sound effects). An incorrect one moves the computer's train. It also incorporates a routine for testing the speed at which the child can find the key in question and allows for this in the reaction time thus not penalising the child who is unfamiliar with the keyboard. (There must be a few of them still around!)

On LOADing, the title "TRAIN RACE" appears in large letters, courtesy of Sir Uncle's "Horizons" tape) and a train chugs and steams across the screen. The friendly computer then introduces itself, asks the player's name, and explains the idea of the game, giving a demonstration of what to do.

After checking the time it takes for the child to locate and press specified keys (this information being used later to determine the delay time during the game) a choice of maximum multipliers from 2 to 9 is offered. The game is now ready to begin.

The computer displays a sum with the multiplier missing and invites the child to press a number key. If the choice is correct the child's train toots, and chugs on one space. If the response is incorrect the computer's train moves on. The game continues until one of the trains reaches the buffers. If it is the child's train that wins, the machine produces a musical border effect.

The score is displayed, along with an invitation to play again with the same or a new player at the same or a different level.

Entering the program

Firstly, LOAD in the "wall" game from your Horizons tape, then BREAK and NEW the machine. (Don't panic — you only want the machine code and that's safe above RAMTOP). Now type in the listing, but note that the capital letters in quotation marks in lines 3, 4, 5, 100, 110, 560 (not the word "WRONG"), 600 (not the word "CORRECT"), 5000, 5050 and 5080 (not the word "CORRECT" are used-defined graphics and must be entered in the graphics mode.

To SAVE the program use:

SAVE "trainrace" LINE 9999: SAVE "mc" CODE 32256, 300

and verify with:

VERIFY "" : VERIFY "" CODE

If you have a printer attached and want a printout of the child's name, the level, and the score add the line

1008 LPRINT n$,m' "right";s, "wrong";t"

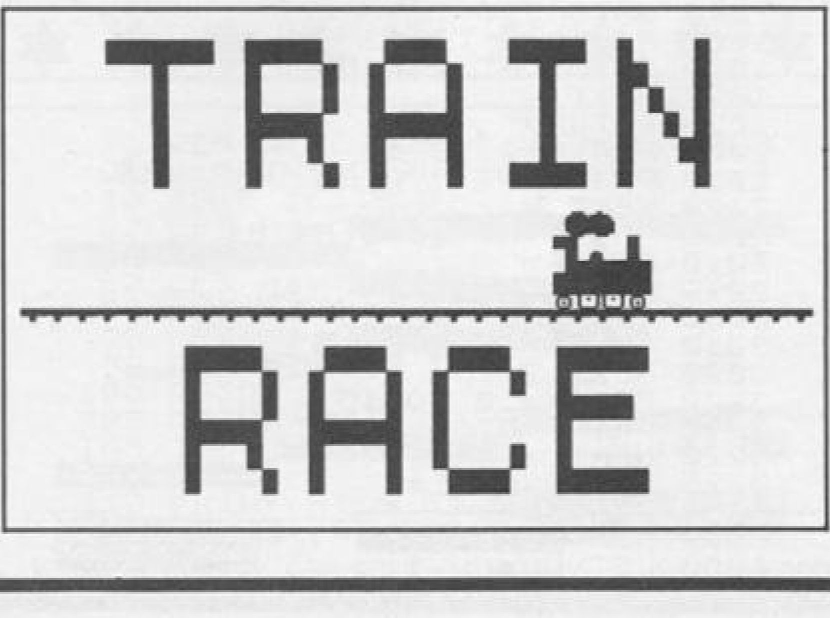
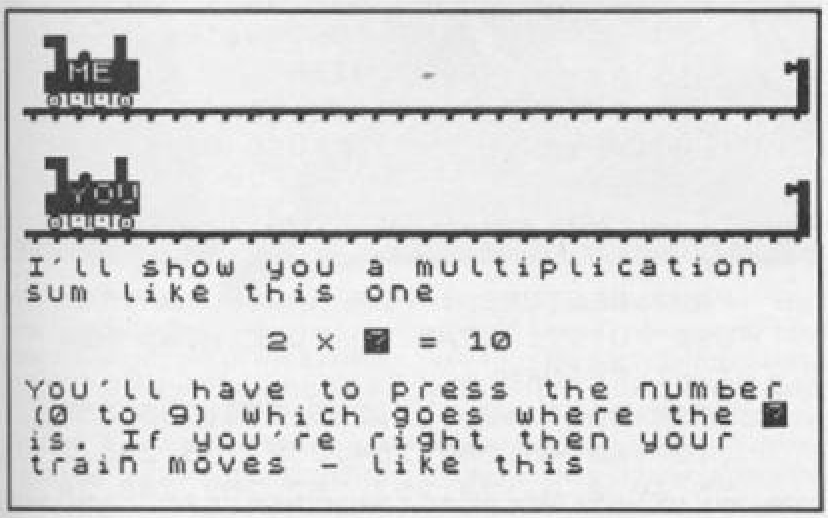


Figure 1. Line breakdown

Line 3	POKEs Caps Shift followed by the title sequence. During this the graphics are set up so as not to produce a noticable pause in the running of the program.
4-5	moves the train across the track.
6	asks for the player's name.
100-110	train draw subroutine.
200-230	train position/colour subroutine.
500-720	main program loop. The computer selects the questions, checks the answers, and produces the smoke graphics before calling the subroutines above.
1000-1040	end/play again? routine.
3000-3100	large letters subroutine.
5000-5090	instructions and demonstration.
5100-5160	checks speed of key press and sets level of play
9000-9050	sets up user-defined graphics.
9999	program autoruns to this line, LOADing in the large letters machine code from the Horizons tape before starting.



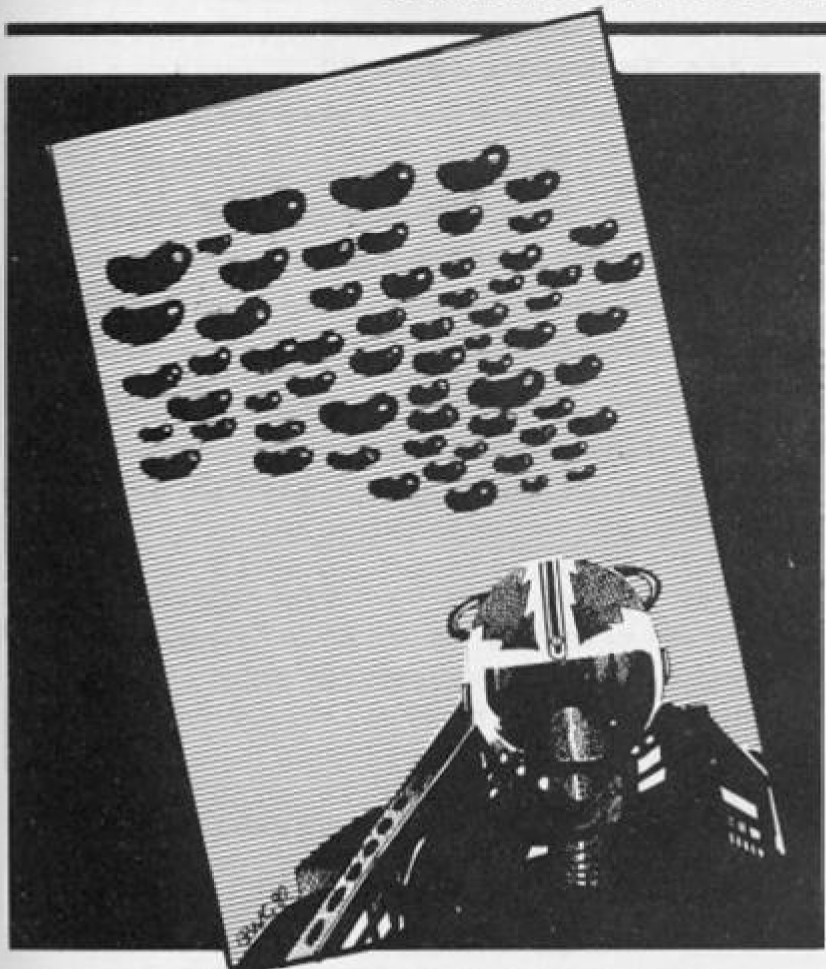



```
   1 REM ***********************
         *Underlined characters*
         *are entered in       *
         *GRAPHICS mode.       *
         ***********************
   3 POKE 23658,8: PAPER 6: BORD
ER 6: CLS : INK 1: LET xs=5: LET
 ys=8: LET yy=0: LET p$="TRAIN":
 GO SUB 3000: LET yy=100: LET p$
="RACE": GO SUB 3000: GO SUB 900
0: PRINT AT 12,0; INK 0;"EEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEE"
   4 INK 2: FOR n=0 TO 25: PRINT
 AT 9,n;" ▜H ▌";AT 10,n;" ▄▄▄▄";
AT 11,n;" DEED": IF n=0 THEN  PA
USE 50
   5 PRINT AT 8,n+1; INK 5;" ABC
": BEEP .01,-20: PRINT AT 8,n+2;
"   ": PRINT AT 9,n+1;" ▜I▌";AT
10,n+1;" ▄▄▄▄ ";AT 11,n+1;"NOPQR"
;AT 8,n+1; INK 5;" AB": BEEP .01
,-30: NEXT n: CLS
   6 INK 2: LET xs=5: LET ys=10:
 LET yy=65: LET p$="HELLO": GO S
UB 3000: INPUT  INK 1;TAB 5;"Wha
t's your name?"''TAB 5;"Type the
 letters then"'TAB 5;"press ENTE
R"''n$: CLS : GO TO 5000
 100 PRINT AT w,x; INK i;" ▜I▌";
AT w+1,x;" ▖";("JKLM" AND b$="YOU
")+("STU" AND b$="ME");AT w+2,x;
"NOPQR";AT w+1,31; INK 1;"G";AT
w+2,31;" ▌": PRINT "EEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEE": BEEP .01,-
20
 110 INK i: PRINT AT w,x;" ▜H ▌"
;AT w+1,x;" ▟"; INVERSE 1;b$; IN
VERSE 0;AT w+2,x;" DEED": INK 1:
 PRINT AT w+1,31;"G";AT w+2,31;"
▌": PRINT "EEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEE": BEEP .01,-30: RETU
RN
 200 LET i=2: LET w=1: LET x=t:
LET b$="ME ": RETURN
 230 LET i=4: LET w=6: LET x=s:
LET b$="YOU": RETURN
 500 PAPER 7: BORDER 7: CLS : LE
T t=0: LET s=t: GO SUB 200: GO S
UB 110: GO SUB 230: GO SUB 110
 510 LET a=INT (m*RND+1): LET b=
INT (RND*10): PRINT AT 12,10;a;"
 X ? = ";a*b: PAUSE d+100: LET a
$=INKEY$: PRINT AT 12,14;a$
 550 IF a$=STR$ b THEN  GO TO 60
0
 560 PRINT AT 14,12; FLASH 1;"WR
ONG": LET t=t+1: FOR n=1 TO 2: P
RINT AT 0,t+1; FLASH 0; INK 5;"A
BC": BEEP .5,36: PRINT AT 0,t+1;
"   ": PAUSE 5: NEXT n: GO SUB 2
00: GO SUB 100: GO TO 700
 600 PRINT AT 14,11; FLASH 1;"CO
RRECT": LET s=s+1: FOR n=1 TO 2:
 PRINT AT 5,s+1; FLASH 0; INK 5;
"ABC": BEEP .5,31: PRINT AT 5,s+
1;"   ": PAUSE 5: NEXT n: GO SUB
 230: GO SUB 100
 700 PAUSE 50: PRINT AT 14,10;"
        ";AT 12,10;"          "
 710 IF s=26 OR t=26 THEN  GO TO
 1000
 720 GO TO 510
1000 IF s=26 THEN  BORDER 2: BEE
P .5,0: BORDER 3: BEEP .75,5: BO
RDER 4: BEEP .25,5: BORDER 5: BE
```

```
EP .5,5: BORDER 6: BEEP .5,Ø: BO
RDER 7: BEEP 1,5
1ØØ5 PAPER 6: BORDER 6: CLS : LE
T xs=2: LET ys=3: LET yy=25: LET
 p$="You Scored": GO SUB 3ØØØ: P
RINT AT 1Ø,12;s;" RIGHT";'''TAB
12;t;" WRONG"
1Ø1Ø PAUSE 2ØØ: CLS : LET xs=3:
LET ys=4: LET yy=5Ø: LET p$="Tha
nk you": GO SUB 3ØØØ: PAUSE 15Ø:
 INK 2: LET xs=2: LET ys=3: LET
yy=1ØØ: LET p$="Play again?(Y/N)
": GO SUB 3ØØØ: PAUSE Ø
1Ø2Ø INK 3: LET xs=1: LET ys=2:
LET yy=135: LET p$="Same Player?
 (Y/N)": GO SUB 3ØØØ: PAUSE Ø: I
F INKEY$<>"Y" THEN  RUN
1Ø3Ø LET yy=16Ø: INK Ø: LET p$="
Same tables? (Y/N)": GO SUB 3ØØØ
: PAUSE Ø: IF INKEY$="Y" THEN  C
LS : GO TO 5ØØ
1Ø4Ø CLS : GO TO 515Ø
3ØØØ LET xx=(256-8*xs*LEN p$)/2
31ØØ LET i=233Ø6: POKE i,xx: POK
E i+1,yy: POKE i+2,xs: POKE i+3,
ys: POKE i+4,8: LET i=i+4: LET w
=LEN p$: FOR n=1 TO w: POKE i+n,
CODE p$(n): NEXT n: POKE i+w+1,2
55: LET w=USR 32256: RETURN
5ØØØ PAPER 7: BORDER 7: LET s=Ø:
 LET t=s: INK 1: CLS : PRINT AT
12,Ø;"Well,";n$;" we're going"''
"to race trains - like these": P
AUSE 2ØØ: GO SUB 2ØØ: GO SUB 11Ø
: GO SUB 23Ø: GO SUB 11Ø: PAUSE
5Ø: FOR n=12 TO 14: PRINT AT n,Ø
;"
  ": NEXT n: PRINT AT 12,Ø;"I'm
driving the RED train": PAUSE 2Ø
Ø: FOR n=1 TO 2: PRINT AT Ø,t+2;
 INK 5;"ABC": BEEP .5,36: PRINT
AT Ø,t+2;"   ": PAUSE 5: NEXT n
5Ø5Ø PRINT AT 12,Ø;"You're drivi
ng the GREEN train": PAUSE 2ØØ:
FOR n=1 TO 2: PRINT AT 5,s+2; IN
K 5;"ABC": BEEP .5,31: PRINT AT
5,s+2;"   ": PAUSE 5: NEXT n
5Ø55 PRINT AT 12,Ø;"
                    "
5Ø6Ø PAUSE 5Ø: PRINT AT 1Ø,Ø;"I'
ll show you a multiplication"''"s
um like this one"''TAB 1Ø;"2 x ?
 = 1Ø"'''"You'll have to press th
e number"'"(Ø to 9) which goes w
here the ?"'"is. If you're right
 then your"'"train moves - like
this"
5Ø7Ø PAUSE 5ØØ: PRINT AT 1Ø,Ø;"
                               "'
"
"'''': FOR n=1 TO 4: PRINT "
                             ": NE
XT n
5Ø8Ø PRINT AT 13,14;"5";AT 15,11
; FLASH 1;"CORRECT": LET s=s+1:
FOR n=1 TO 2: PRINT AT 5,s+1; IN
K 5; FLASH Ø;"ABC": BEEP .5,31:
PRINT AT 5,s+1;"   ": PAUSE 5: N
EXT n: GO SUB 23Ø: GO SUB 1ØØ
5Ø9Ø PRINT AT 18,Ø;"If you're wr
ong, or don't"'"answer then my t
rain moves": PAUSE 2ØØ: CLS
51ØØ PRINT "Let' practice pressi
ng the"'"numbers": PAUSE 15Ø: PR
INT ''TAB 13;"Ready!": PAUSE 75:
 CLS : LET d=Ø: LET a$="4Ø518":
FOR n=1 TO 5: PRINT '''TAB 12;"P
ress ";a$(n): FOR c=1 TO 1ØØØ: I
F INKEY$=a$(n) THEN  GO TO 512Ø
511Ø NEXT c
512Ø IF c>d THEN  LET d=c
513Ø CLS : PAUSE 25: NEXT n
514Ø CLS : PRINT "OK, we're read
y to play": RANDOMIZE
515Ø PRINT '''"Press maximum mul
tiplier(2 to 9)": PAUSE Ø: LET m
$=INKEY$
516Ø LET m=VAL m$: CLS : GO TO 5
ØØ
9ØØØ RESTORE : FOR n=USR "a" TO
USR "u"+7: READ a: POKE n,a: NEX
T n: RETURN
9Ø5Ø DATA 6Ø,126,255,255,255,255
,127,6Ø,48,252,254,255,255,255,2
55,6Ø,Ø,Ø,12Ø,252,252,252,248,24
Ø,255,255,255,56,68,84,68,56,255
,255,255,13Ø,146,13Ø,13Ø,12Ø,255
,255,24,24,Ø,Ø,Ø,Ø,15,2Ø7,255,25
5,2Ø7,15,15,15
9Ø6Ø DATA Ø,Ø,Ø,Ø,Ø,6,15,15,Ø,Ø,
Ø,Ø,Ø,96,24Ø,24Ø,255,247,251,253
,254,254,254,255,255,22Ø,187,123
,251,251,252,255,255,59,219,219,
219,219,6Ø,255,24Ø,2Ø8,2Ø8,2Ø8,2
Ø8,2Ø8,48,24Ø,15,15,15,3,4,5,4,3
,255,255,255,136,73,72,72,135,25
5,255,255,4Ø,41,4Ø,4Ø,199,255,25
5,255,35,36,37,36,195,24Ø,24Ø,24
Ø,128,64,64,64,128,255,251,249,2
5Ø,251,251,251,255,255,216,155,8
8,219,219,216,255,255,31,255,63,
255,255,31,255
9999 CLEAR 32255: LOAD ""CODE 32
256,3ØØ: GO TO 1
```

Astro Balloons

A crazy game from D. Mearns of studious Oxon!



Whilst out in your hot air balloon one Sunday afternoon, you accidentally drift out of the Earth's atmosphere and through a passing black hole into another solar system. You land on the planet Garthrog where the emperor tells you that to get back through the black hole you will need a good supply of Ainthor crystals. However, the crystal field is guarded by several asteroid belts. There is only one way through each asteroid belt, and even if you succeed you must have ten gold bars to pay the gatekeepers at points along the way. The emperor gives you ten to start off with, but after that you must pick up the ten on your way. The emperor then has your balloon refuelled with a special gas which will leave toxic fumes behind. If you double back on yourself you will die instantly.

You may wonder why stars have been used as the asteroids instead of User Defined Graphics. This is because SCREEN$ — which I have used to detect collisions — cannot recognize UDGs. Stars looked the most realistic out of the Sinclair character set.

Another set of instructions is given in the program, along with a choice of sound or not, and the skill level. This ranges from 0 (incredibly tedious) to 9 (impossibly fast). Being a hot air balloon there are no brakes. This means, that once you have started going in a certain direction you will keep going (regardless of whether or not you are pressing that key) in that direction until another direction key is pressed. The keys to use are given in the program. Good luck!

Notes

For those of you who are interested, I have provided a brief breakdown of the program plus a list of the variables used (see figure 1).

Figure 1. Variables and line breakdown.

20-90	Print balloon and check for win. INKEY$. (Stages 1 to 3).
100-410	Move balloon and check for crash. (Stages 1 to 3).
2000-2330	Print random maze for stage 4.
2500-2560	Print balloon. INKEY$. (Stage 4).
2600-2910	Move balloon and check for crash. (Stage 4).
3000-3010	Check for win. (Stage 4).
3700-3750	End of stage routine.
3800-3820	Crash routine.
8000-8080	Print instructions.
9000-9070	Initialisation procedures.
9100-9220	Print maze. (Stages 1 to 3).
9998-9999	User Defined Graphics.

a	reserved for random numbers.
d	direction travelling in.
f,g	reserved for FOR . . . NEXT loops.
gold	number of gold bars collected.
pa	skill level.
pause	amount of time to pause in between moves of the balloon.
sc	score.
screen	stage (1 to 4).
x,y	X and Y co-ordinate of balloon.

```
   1 REM ***********************
         *Underlined characters*
         *are entered in       *
         *GRAPHICS mode.       *
         ***********************

   5 LET SCREEN=4: LET SC=Ø
   6 POKE 23658,8
   7 GO SUB 999Ø
  1Ø GO SUB 9ØØØ
  15 POKE 23658,8
  2Ø PRINT AT x,y; INK 3;"A": IF
 s$="y" THEN  BEEP .ØØ8,2Ø
  25 PAUSE pause
  3Ø IF X=1Ø AND Y=6 AND gold=1Ø
 THEN  GO TO 37ØØ
  35 IF INKEY$="M" OR INKEY$="Ø"
 THEN  PAUSE 1: PAUSE Ø
  4Ø PRINT AT x,y; INK 3;"."
  5Ø IF INKEY$="5" OR INKEY$="O"
 THEN  GO TO 1ØØ
  6Ø IF INKEY$="6" OR INKEY$="A"
 THEN  GO TO 2ØØ
  7Ø IF INKEY$="7" OR INKEY$="Q"
 THEN  GO TO 3ØØ
  8Ø IF INKEY$="8" OR INKEY$="P"
 THEN  GO TO 4ØØ
  9Ø GO TO (d+4)*1ØØ-4ØØ
 1ØØ IF ATTR (x,y-1)=6 THEN  PRI
NT AT x,y-1;" ": LET sc=sc+1Ø: B
EEP .5,2Ø: LET gold=gold+1
 1Ø5 LET SC=SC+1: IF SCREEN$ (x,
```

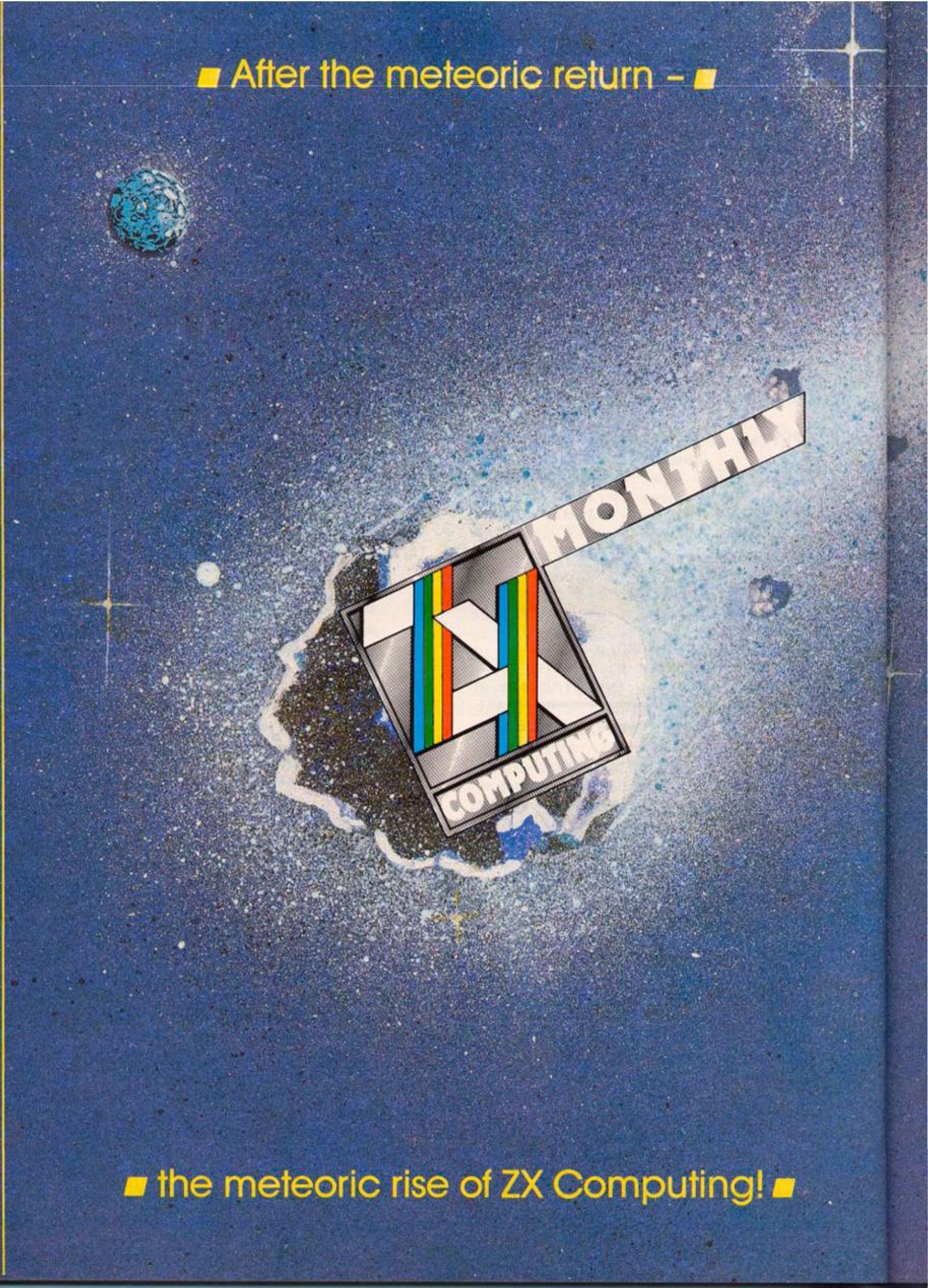
```
y-1)<>" " THEN  GO TO 3800
 110 LET d=1: LET y=y-1: GO TO 2
0
 200 IF ATTR (x+1,y)=6 THEN  PRI
NT AT x+1,y;" ": LET sc=sc+10: B
EEP .5,20: LET gold=gold+1
 205 LET SC=SC+1: IF SCREEN$ (x+
1,y)<>" " THEN  GO TO 3800
 210 LET SC=SC+1: LET d=2: LET x
=x+1: GO TO 20
 300 IF ATTR (x-1,y)=6 THEN  PRI
NT AT x-1,y;" ": LET sc=sc+10: B
EEP .5,20: LET gold=gold+1
 305 LET SC=SC+1: IF SCREEN$ (x-
1,y)<>" " THEN  GO TO 3800
 310 LET d=3: LET x=x-1: GO TO 2
0
 400 IF ATTR (x,y+1)=6 THEN  PRI
NT AT x,y+1;" ": LET sc=sc+10: B
EEP .5,20: LET gold=gold+1
 405 LET SC=SC+1: IF SCREEN$ (x,
y+1)<>" " THEN  GO TO 3800
 410 LET d=4: LET y=y+1: GO TO 2
0
2001 LET d=8
2005 PAPER 0: CLS : INK 7: BORDE
R 0
2010 FOR f=1 TO 22: PRINT "*****
**********'****************": NE
XT f
2011 LET x=11: LET y=1
2020 LET a=INT (RND*3)+1
2025 PRINT AT x,y; INK 2;"."
2030 GO TO a*100+2000
2100 LET y=y+1
2105 IF y>30 THEN  GO TO 2500
2110 GO TO 2020
2200 LET x=x+1
2210 IF x>20 THEN  LET x=20
2220 GO TO 2020
2300 LET x=x-1
2315 IF x<1 THEN  LET x=1
2330 GO TO 2020
2500 LET x=11: LET y=1
2510 PRINT AT x,y; INK 3;"B"
2513 PAUSE pause
2515 IF INKEY$="0" OR INKEY$="M"
 THEN  GO TO 3000
2517 PRINT AT x,y;" "
2518 BEEP .008,20
2520 IF INKEY$="5" OR INKEY$="O"
 THEN  GO TO 2900
2530 IF INKEY$="6" OR INKEY$="A"
 THEN  GO TO 2600
2540 IF INKEY$="7" OR INKEY$="Q"
 THEN  GO TO 2700
2550 IF INKEY$="8" OR INKEY$="P"
 THEN  GO TO 2800
2560 GO TO D*100+2000
2600 LET d=6: IF SCREEN$ (x+1,y)
="*" THEN  GO TO 3800
2605 IF SCREEN$ (x+1,y)="." THEN
 LET sc=sc+INT (RND*10)
2610 LET x=x+1: GO TO 2510
2700 LET d=7: IF SCREEN$ (x-1,y)
="*" THEN  GO TO 3800
2705 IF SCREEN$ (x-1,y)="." THEN
 LET sc=sc+INT (RND*10)
2710 LET x=x-1: GO TO 2510
2800 LET d=8: IF SCREEN$ (x,y+1)
="*" THEN  GO TO 3800
2805 IF SCREEN$ (x,y+1)="." THEN
 LET sc=sc+INT (RND*10)
2810 LET y=y+1: GO TO 2510
2900 LET d=9: IF SCREEN$ (x,y-1)
="*" THEN  GO TO 3800
2905 IF SCREEN$ (x,y-1)="." THEN
 LET sc=sc+INT (RND*10)
2910 LET y=y-1: GO TO 2510
3000 FOR F=0 TO 21: FOR G=0 TO 3
1: IF SCREEN$ (F,G)="." THEN  PA
USE 1: PAUSE 0: GO TO 2520
3010 NEXT G: NEXT F
3700 PRINT AT 0,0;: FOR F=1 TO 2
2: LET A=INT (RND*6)+1: PRINT  I
NK A;"**************************
******"
3710 NEXT F
3720 INK 2: PAPER 6: PRINT AT 8,
10; FLASH 1;"WELL DONE !!";AT 16
,11;"SCORE:";SC: PAUSE 50: LET S
CREEN=SCREEN+1
3730 IF SCREEN>4 THEN  LET SCREE
N=1: LET PAUSE=PAUSE-5: IF PAUSE
<1 THEN  LET PAUSE=1
3750 GO SUB 9100: GO TO 20
3800 INK 2: PAPER 6: PRINT AT 7,
9; FLASH 1;"YOU CRASHED !!";AT 1
4,12;"SCORE:";sc
3805 FOR f=1 TO 200: NEXT f
3810 PRINT AT 21,0;" PRESS ANY K
EY FOR ANOTHER GAME"
3820 IF INKEY$="" THEN  GO TO 38
20
3830 RUN
4000 LET gold=10: IF screen>1 TH
EN  LET gold=0
8000 INK 6: PRINT AT 2,0;"Stage
1-Guide the balloon (B)
  round the course while
  avoiding the deadly
  asteroids (*) and your
  own trail (.)."
8010 PRINT '"Stage 2-As stage 1,
```

```
but you must            eat all the
 gold bars              (B) to pass
 through the            gate."
8020 PRINT '"Stage 3-As above,bu
t more                  asteroids h
ave moveed in"
8030 PRINT '"Stage 4-Negotiate y
our way along           the twistin
g passage.              Collect all
 the crystals           (.)to pass.
Press pause             when compl
eted."
8040 PAUSE 1: PAUSE 0
8050 INK 5: PRINT AT 2,0;"

  UP......7 or Q

  DOWN....6 or A

                        "
8060 PRINT "            LEFT....5 or
 O
                        RIGHT...8 or
 P
                        PAUSE...0 or
 M        "
8070 FOR f=1 TO 9: PRINT "
                              ": NEX
T f
8080 PAUSE 1: PAUSE 0
9000 INK 7: PAPER 0: BORDER 0: C
LS : PRINT TAB 9; INK 4;"CRAZY B
ALLOONS";TAB 9;"▀▀▀▀▀▀▀▀▀▀▀▀▀": 
 PRINT AT 21,0; Derek Mearns &
 Robert Enright"
9010 FOR f=0 TO 40: NEXT f
9012 PRINT AT 3,0;"Do you want i
nstructions ?": IF INKEY$="y" OR
 INKEY$="Y" THEN  GO TO 8000
9014 IF INKEY$="n" OR INKEY$="N"
 THEN  GO TO 9018
9016 GO TO 9012
9018 FOR f=1 TO 20: NEXT f
9020 PRINT AT 3,0;"Do you want s
ound ?       ": IF INKEY$="" THE
N  GO TO 9020
9030 IF INKEY$="y" OR INKEY$="Y"
 THEN  LET s$="y": GO TO 9050
9040 IF INKEY$="n" OR INKEY$="N"
 THEN  LET s$="n": GO TO 9050
9045 GO TO 9030
9050 PRINT AT 3,0;"Enter the ski
ll level (0 TO 9)"
9060 INPUT pa: IF pa<0 OR pa>9 T
HEN  GO TO 9060
9070 LET pause=(9-pa)*10+1
9100 RESTORE : INK 7: PAPER 0: C
LS : BORDER 0: IF screen>3 THEN
 GO TO 2000
9110 PRINT "*********************
**************       **********
***  ********          **
 *    *******"
9120 PRINT "*  ******
    *     ***    **    *   *******
*  ***     ****     *     *** ****
 *******   **"
9130 PRINT "***   *
     ***  *****   *  *          *
           ***     *   ***********
****       * *"
9140 PRINT "*    *"; INK 2;" ▄▄ ";
 INK 7;"  ****      *********   *
*  **"; INK 2;"▌▐"; INK 7;"    *
          *          **  **  *
  ******             *"
9150 PRINT "*  **    **    *****
*   *****  **  **     ******
*********  **  ****     ****   *
    ****   *"
9160 PRINT "*    **      *      ****
    **    *****   *     *      *****
**  ***     ***   *    *   ********
***  ***    *"
9170 PRINT "**   *        *********
***    ***   **"; INK 2;"▌ ▐"; INK
 7;"**    **************        *
*"; INK 2;"▙▄▟"; INK 7;"***   ***
*************         *"
9180 PRINT "*********************
*************"
9190 LET gold=10
9200 INK 6: IF SCREEN>1 THEN  PR
INT AT 11,1;"B";AT 1,6;"B";AT 2,
16;"B";AT 7,17;"B";AT 6,14;"B";A
T 12,11;"B";AT 9,16;"B";AT 10,25
;"B";AT 17,5;"B";AT 11,5;"B": LE
T gold=0
9210 INK 4: IF screen=3 THEN  PR
INT AT 10,1;"*";AT 2,17;"*";AT 3
,19;"*";AT 6,19;"*";AT 3,2;"*";A
T 3,11;"*";AT 3,28;"*"
9220 IF screen>2 THEN  PRINT AT
5,29;"*";AT 7,26;"*";AT 12,22;"*
";AT 10,26;"*";AT 15,13;"*";AT 1
8,8;"*";AT 13,5;"*"
9980 RETURN
9990 FOR f=144 TO 145: FOR g=0 T
O 7: READ a: POKE USR CHR$ f+g,a
: NEXT g: NEXT f
9996 LET d=3
9997 LET x=19: LET y=2
9998 RETURN
9999 DATA 16,56,124,56,84,68,68,
124,0,0,0,60,126,255,0,0
```


After the meteoric return –
ZX
MONTHLY
COMPUTING
the meteoric rise of ZX Computing!

The return of Halley's Comet from its round trip of the solar system has always heralded a momentous event.
1986 is no exception.

ON MARCH 28 ZX COMPUTING GOES MONTHLY

With a fresh new look, full colour pages and the latest news and reviews, **ZX Computing Monthly!** will be geared for owners of all Sinclair machines. An expanded games review section featuring colour screenshots and in-depth analysis of the top releases makes **ZX Computing Monthly!** a must for the avid games player.

For Sinclair owners searching for new uses for their machines ZX will explore novel applications and utilities.

ZX will continue to publish high quality programming projects and series on how to improve your computing expertise.

ZX will be interviewing leading software authors to bring you an invaluable insight into how the best selling utilities and games are created.

All this plus our regular adventure column Mindplay, expert help with computing problems, programming contests, exciting competitions and special offers makes the new **ZX Computing Monthly!** indispensible for the Sinclair owner. Don't miss it -place an order with your newsagent now!

FROM MARCH 28 ONLY £1.50

So you want to buy a printer!?

John Wase's jaundiced look at hard-copy machines.

Well, what do you want it for? If you simply want to LIST programs a ZX Printer will probably suffice — it's incredibly cheap (assuming that you can still find one for sale). On the other hand, printing text, or data after calculations is a much more demanding occupation, needing printers whill take up to A4 paper. So, check your piggy-bank and then decide upon the paper size you want, decide whether narrow is sufficient, decide whether you need perforated, roller paper or cut sheets. (If you want to print out programs, the computer can have apoplexy if you try to stop and change the paper — you really need roller or perforated for this purpose). Good, you've decided. Now for the printer.

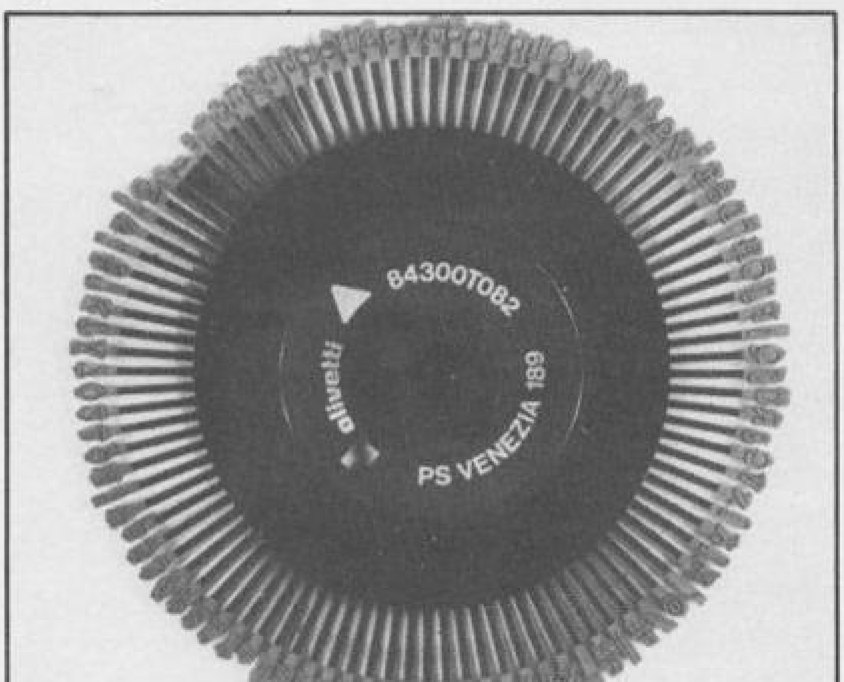
Daisy, daisy . . .

Daisy wheel printers have a plastic wheel, like a daisy, about 3" across. Each petal has a letter on it, and the relevant letter is struck against a ribbon. Some cheap types have fabric ribbons, but the better have cellulose film ribbons and give superb letter quality bank-manager stuff. They're not too noisy, but fairly slow (the cheapest only a few characters per second), and you can print only what's on the daisy-wheel: subscript and superscript are available on some through software commands which move the carriage up or down, but print is changed only by changing the daisy-wheel — tortuous in mid-stream.

Double-strike dots

Dot-matrix printers are probably the most versatile. They print a series of dots and the greater the density of dots the better the quality of the resultant letters. Various methods of double striking improve still further the letter quality. The best is almost (but not quite) as good as daisy-wheel, and usually a lot quicker, though they can be rather noisy, They will often print pictures — useful if you want screen dumps. Their letters are retained in their own ROM (Read Only Memory) where of course they can't be fiddled with; with more expensive ones have a range of typefaces (including italic) and the most expensive ones an additional RAM (Random Access Memory) enabling you to design your own leters or to download other standard typefonts.

Fig 1. A daisy-wheel, and the sort of result one gets from it.



Double-strike	Double-strike
Dot-matrix printers are pr	Dot-matrix printers are pr
a series of dots; the grea	a series of dots; the grea
quality of the resultant	quality of the resultant
striking improve still fur	striking improve still fur
almost (but not quite) as	almost (but not quite) as
quicker, though they can b	quicker, though they can b
pictures - useful if you w	pictures - useful if you w
retained in their own ROM	retained in their own ROM
they can't be fiddled with	they can't be fiddled with

Fig 2. Normal and emphasized mode on an Epson FX80 printer.

Fig 3. A dot matrix printer with too small a matrix to permit proper descenders.

```
Dear John,

As per our telephone conver
outline details of the Journal

The order which we recently ser
for the University.

If you are interested let me kn
system, I will start work on tr
```

Paper, ribbon and interface

Some dot-matrix printers need special paper (can be pricey), some need a ribbon, some will do with either. Some print in a variety of colours by raising or lowering a multicolour ribbon. The cheapest of all, the original ZX dot-matric printer, (now approaching obsolescence), the Alphacom and the Floyd respond directly to the Spectrum ROM routines and connect up directly to the Spectrum outlet port. All other printers, of

whatever type will require you to buy a separate interface and connecting cable: you must add the cost of this to the cost of your printer.

Difficult descenders

The next cheapest dot-matrix printers are likely to print on relatively narrow paper, then progress up to A4. Some of the cheapest of even the A4 types will still have insufficient dots to give letters with proper descenders: text from such printers can be difficult to read. If this worries you, don't buy.

Do remember that you have by now passed the price of the Spectrum by quite a long way. A good printer can be driven very satisfactorily by an inexpensive computer. Isn't it worth paying just a little more to achieve a reasoanble print quality, for once you have bought a printer at that sort of price, you're stuck with it!

PLOT and DRAW

The third sort of printer is the printer-plotter. This usually has a fount of letters which it can print in a variety of sizes by complicated movements of the pen (side to side) and the roller (up and down). They will also respond to commands to PLOT and DRAW, and thus ~~make~~ all sorts of pictures and graphs. As the mechanism wears, so the letters get more and more distorted. Some of the cheaper ones require months of work and a long, long program to get them to, say, draw graphs. Don't be overcome by the demonstration picture which it will draw; (one of our post-docs spent many hours providing software for a cheap plotter to draw graphs from data put into a B * *B, although the thing would draw the most marvellous demonstration graphs on its own). So, unless you have too much time on your hands, make sure programming is easy.

If you need to draw overhead projection transparencies or professional graphs for reproduction, do make sure that appropriate pens are available and will fit, and that overhead projector transparencies are firmly gripped and do not slip.

Turning turtle

Finally, there are the turtles, which walk along the floor or table with 'penup' and 'pendown' commands. Although they are claimed to produce large posters/drawing/plans, they move only on the basis of their own weight and frictional grip and errors are cumulative; I do not believe their accuracy is sufficient for general use as a printer.

Decisions, decisions

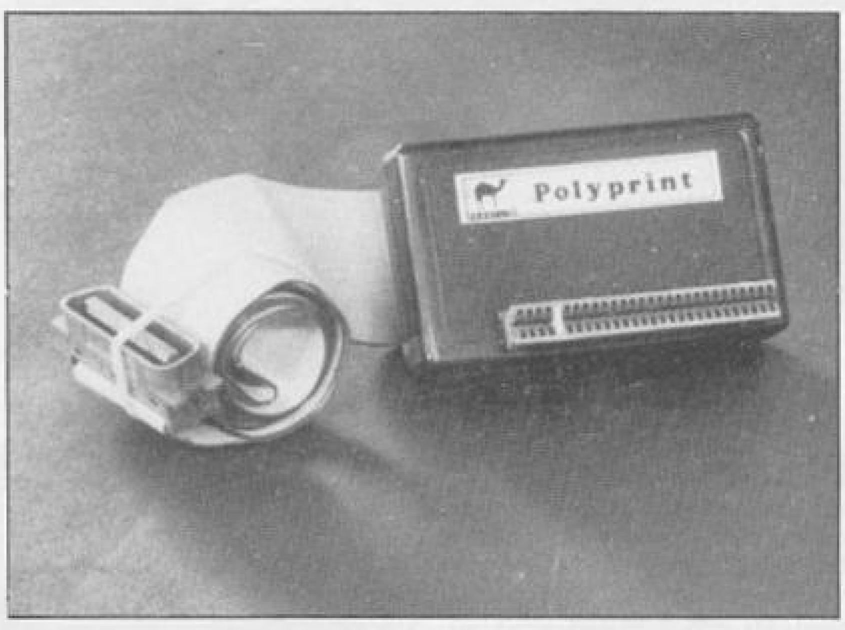
So, you've decided which sort. It can be bought from a general multiple, from a specific computer shop, or mail order. Which one?

A few tips might help.

1. See a range of the type you like demonstrated if at all possible.
2. Ask about the prices of special paper, special pens and replacement ribbons, together with the number of *reasonable* copies from each ribbon. Check the availablity of these items.
3. If portable, ask how long the batteries last (on some small portables, they'll do only four or five pages before expiring, so you'll either have to have rechargeable batteries and a recharger, or a main adaptor (extra?) or both).
4. Ask all your friends about reliability. A cheap and nasty dot-matrix that jams and loses your text is a curse. If it is being used, for instance, to monitor an experiment and print hourly results, you lose the experiment too, for it jams up the computer. Read all the reviews you can – use your local library.
5. Buy by mail order only if you are convinced that the printer is reliable and won't need constant servicing/sending to the makers. Buy cheap ones only from a local shop where you can complain if/when they go wrong.
6. Watch the price. Some of the more popular (and very reliable) printers like the Epson range can vary in price by over £100 for the same model, but fortunately can be bought with confidence by mail-order. So, in these cases, shop around.

Good printing!

Polyprint, the multilingual printer interface.



This is a parallel interface in the usual box with the familiar ribbon-cable. The difference is that it contains not just the usual Z80A PIO chip, but that it also has an additional 8K EPROM. This is arranged in banks of 1K, each of which displaces, in turn, the 15-16K area of the Spectrum ROM. So what? Well, this area contains the character set, and each bank, as well as containing the printer-driver software (which includes a COPY routine), also contains a character set. On switching on, bank 0 is selected, which is the standard Spectrum set. Banks 1, 2, 4, 5, 6 and 7 correspond to French, German, Danish, Swedish, Italian and Spanish. "All very pretty," you may say, "but will I ever use this?" Perhaps not, but bank 3, besides a Tasword printer-driver, contains data to change the Tasword character set to those other nationalities, too, and this is the real value of the package.

This interface is not the easiest to use. It is not the strongest, nor the cheapest, nor yet the most user-friendly, in spite of the very detailed instructions. However, most multilingual users will also want to use a word-processor, (e.g. Tasword), and here it could be invaluable, for by a few alterations to Tasword's BASIC program, a variable, (e.g. *n*), could be used which would automatically switch the text and also the printer on printing (the examples are for the Epson FX80, but can easily be adapted to other printers). The variable could well be stored along with, for example, commercial addresses on *Masterfile*, and, by means of Mailmerge, the foreign addresses and envelopes would be correctly printed. All clever stuff if you need a number of foreign languages.

However, the real power of this device lies in the ease with which the various 1K banks can be called. Perhaps you don't want all those Spectrum displays – with the exception of the Tasword bank, (which contains all the National character sets) – I probably wouldn't! This leaves you with at least six 1K banks to play with. Using an EPROM-blower (e.g. Cambridge Microelectronics' PROMER-SP or BLOPROM-SP), the contents of the EPROM can be read into RAM and SAVEd on tape (for subsequent replacement if necessary). The RAM can then be POKEd as required and the EPROM reblown. You could, for instance, incorporate foreign character fonts like Arabic or Greek, or mathematical symbols, perhaps with the data to enable downloading of the printer. This gives this interface unique advantages, (provided that you have accumulated all the other peices of gear).

If I wanted just to write in German, and nothing else, then I would be inclined merely to POKE the relevant new letters into Tasword. This is a specialist piece of equipment and won't appeal to everyone. However, to the specialist the combination of all the facilities it offers could prove invaluable.

Polyprint is available, mail-order, from Cambridge Microelectronics, 1 Milton Road, Cambridge, price £44.95 plus V.A.T.

Microdrive to Wafadrive

Carol Brooksbank deals with the problems of converting Microdrive programs to work on the Wafadrive.



If you are thinking of buying a Rotronics Wafadrive, you may be wondering whether it is possible to convert the Microdrive options on commercial programs so that they can be used with Wafadrive. It is not only possible, it is easy.

I have recently converted the Campbell Masterfile program, with the MF Print option for full size printers, and the examples given in this article are taken from that.

First, you must examine the Basic program, and identify all the lines which will need conversion. They are easy to spot, as keywords such as LOAD or SAVE will be followed by an asterisk and inverted commas enclosing a lower case "m", ie.

```
LOAD * "m";d;n$
SAVE * "m";d;n$ CODE,a,b
LOAD * "m";d;n$ CODE
SAVE * "m";d;n$ DATA f$()
```

In these examples, *d* represents the drive number, *n$* the program name, *a* the machine code address, *b* the number of bytes and *f$* the data array.

In the Masterfile program, the drive number is specified by pressing keys 1-8 to select a particular microdrive in response to the prompt TAPE/MICRODRIVE? Key 0 selects the tape option. You have to decide whether it is necessary for you to select a particular wafadrive in this way. It is very rarely essential to switch from one drive to another in the course of a program, because the software writers cannot be sure that a user will own more than one drive.

I decided to make the program operate on the default drive, drive a on power up, because it is easy to go into Basic and designate drive b as the default drive if necessary. If you feel you must be able to switch drives without going into Basic, you will have to insert some extra lines of Basic, possibly in the form of a subroutine if there are not enough free lines at the point where you are making the alterations.

```
IF d=1 THEN LET d$="a"
IF d=2 THEN LET d$="b"
LET q$=n$
LET n$=d$+":"+q$
```

The instructions which follow will operate on the specified drive if the Basic listed above is present, but on the default drive without it.

Alter simple LOAD and SAVE instructions which load and save Basic so that they read

```
LOAD *n$
SAVE n$
SAVE *n$ LINE nnnn (auto-running programs)
```

Machine code saving instructions should be altered to read

```
SAVE *n$, a,b
```

Machine code loading instructions are exactly like Basic ones. the word CODE is not used in Wafadrive instructions. You must remember though, that you cannot have two programs on the same wafer with the same name, so if the Basic and code program names are the same, alter one or the other. I simply add A, B etc. to the machine code name, so that if the Basic program is MF, the machine code is MFA. Also, if the code being saved is something such as a file, so that you may wish to save updated versions under the same name, use the form;

```
SAVE #n$, a,b
```

This will avoid having to erase the old file, or give the new one another name before being able to save it.

Data

The only area where you meet any difficulty is in the saving and loading of data arrays. There are no Wafadrive equivalents to the Microdrive data instructions.

```
SAVE (or LOAD) *"m";d; n$
DATA f$()
```

Data is normally saved on wafers by using the **OPEN** # and **PRINT** # instrcutions, and read by using the **OPEN** # and **INPUT** # instructions. You could write extra lines of Basic to use this method, but it is rather cumbersome and there is a much easier way.

Alter the datas loading lines to

MERGE ✱n$

Write the following short program, and save it on the wafer you are using for your main program, calling it whatever you like.

```
0    LOAD "" DATA f$()
9999 REM
```

If LINE 9999 is used by the main program, replace it with any line number which is unused. f$ must be the array letter used by the program.

Whenever you are using your main program, use the save to tape option for saving any files which are in the form of data arrays. It is a wise precautioin to make backup copies of wafer files on tape anyway, so you will not be wasting time. Then, load in the short program above from wafer, run it, start the tape and the file will be loaded into the Spectrum. Now delete line 10, and save the program on wafer, using the appropriate file name. The file will be saved, together with the Basic REM line, and you will be able to load it into your main program quite normally when required, because the program will ignore the merged REM line.

To anyone used to loading programs from tape, this method of loading different Basic programs may sound slow and elaborate, but remember that programs load very quickly from the wafers. You do not have to search for the programs, the Wafadrive does that for you, so changing programs in mid-stream is quick and easy.

You should keep all the Basic, machine code and file programs that you will wish to use together on the same wafer, so that loading them as needed is quick and easy. I wrote a loading program for Masterfile which loads the Kempston interface software, the Masterfile machine code and the Mastefile Basic so that **LOAD ✱"masterfile"** gets the whole program running for me.

Interface

Why do I have a Kempston interface when the Wafadrvie has Centronics and RS232 interfaces, you ask. Well, I already had both a Kempston and a morbid dislike of parting with my hard-earned when I bought the Wafadrive, so I saw no reason to buy another Centronics connecting lead when the Kempston works perfectly well with it.

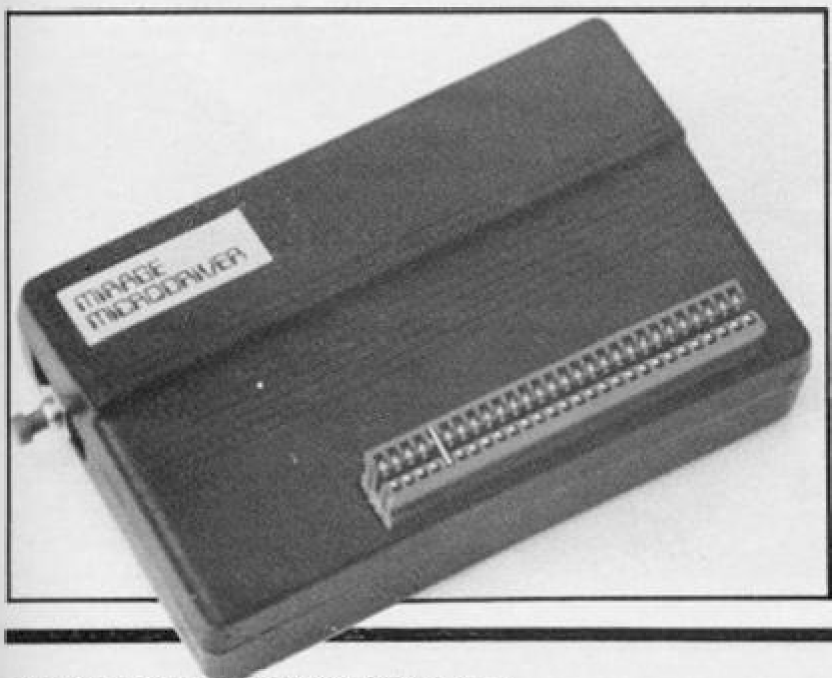
What about making backup copies of games onto Wafadrive? I have put Psion Chess onto wafer successfully, and it loads much more quickly. You have two problems in this area. First, can you break into the program successfully, to make any sort of copy? If so, you are halfway there. Whether you can now copy to wafers depends on how much memory is used by the program concerned. The Wafadrive uses part of the Spectrum memory for its own operations, and there may not be room for the program and the Wafadrive to operate together. Psion Scrabble is an example. If the Wafadrive is operative when you try to load Scrabble, you get the report 'Out of memory', and you cannot initialise the Wafadrive with Scrabble already loaded. If you can enter NEW ✱ when the program is loaded you have no problem, if you can't forget it. remember, though, that to keep on the right side of the law, any backup copies you make must be entirely for your own use, and not supplied to others.

Any other problems? Well, the only other one I met was, I am sure, peculiar to me. Owing to the curious geography of my small home, the printer sits on top of the freezer, and whenever the freezer motor cuts in and out, it resets the Spectrum. My dealer tells me that something called 'The Plug' would cure this, and I may yet brush the moths off my Access cards and try it, but in the meantime I switch the freezer to fast freeze when I use the Spectrum so that the motor is on permanently, and that cures it. Apart from that, no problems. In fact, I find the program conversions quite absorbing, and the resulting speed when using the Wafadrive a great blessing. I am sure you will too. ■

Son of Microdriver Strikes Back!

The Mirage Microdriver got some excellent reviews when it was first launched just a few months ago, and now Mirage have produced a Version 2.0 Microdriver that is faster and also offers some new facilities.

In case you missed the reviews of the original version I'll just do a quick recap. The purpose of the Microdriver is to perform tape to microdrive, or even tape to tape transfers of all Spectrum software, so that you can now use your microdrive for LOADing commercial software without needing to spend hours of hacking to get past piracy protection systems. However, the Microdriver does not encourage piracy, since any back-up copies of software will only run if the Microdriver is still connected to the Spectrum. This doesn't make piracy impossible, but since the Microdriver costs almost £40 it does make it financially impractical, so that should keep the industry happy.



The Microdriver looks just like a joystick interface, except for a small red button on one side, and an expansion port in the back. It plugs into the rear port on the Interface 1, and once the microdrive is set up with a cartridge in it, you can load whatever software you choose from tape. Once the software is loaded you then press the button on the side of the Microdriver, follow the prompts, and let the thing do all the work for you.

The whole process is very easy to follow as the Microdriver doesn't require you to do much more than choose the option you want (SAVE/LOAD etc) and give the program a name. With its Version 2.0 ROM, the new Microdriver is even faster than before, and when I made a backup copy of a game that took five minutes to load from cassette, the microdrive version loaded in only eight seconds (thirty seven and a half times faster than tape)!

The new facilities available with Version 2.0 are; an improved POKE facility that allows you to enter pokes for infinite lives and so on; an option that allows you to choose whether or not you want to save the current screen display — this can save about 7K of space on the cartridge and further reduces loading times; COPY — this allows you to print a complete screen dump to the ZX Printer (and, as far as I can tell, to other dedicated printers such as the Alphacom 32 and Seikosha GP50S). There is also a DUMP facility, that allows you to store screen dumps or sections of memory onto microdrive.

If you've got a microdrive and want to use it to speed up loading of software then the Microdriver is an excellent device. It's reliable and very simple to use, and though, at £39.95 it isn't cheap, if you use a lot of cassette based software then its convenience value should justify the expense.

For owners of the existing Version 1.0 Microdriver, Mirage are quite laudably offering an upgrade sevice at a cost of £5.95 when the original Microdriver is returned.

Enquiries, upgrade order etc. to; Mirage Microcomputers Lts, 24 Bank St, Braintree, Essex CM7 7UL (tel. 0376 48321). ■

Interfaces — face to face.

The problem of hooking up the Spectrum to a suitable printer is investigated by John Wase.

Not so very long ago, Matt Nicholson, writing for *You and Your Barclaycard*, suggested in an article on home computers that there was some difficulty in connecting a Spectrum up to a printer. How times have changed! It's now not only easy, but you're spoilt for choice over the means available. Let's look at the way it's done and some of the alternatives available.

Hardware hassles . . .

There are likely to be four types of Spectrum hardware to consider — the original rubber-button Spectrum, the Spectrum+, Interface 1 and add-on keyboards, each influencing the way a printer might be connected.

Now, have you chosen your printer? You have? You've chosen it already, have you? By mail order, too? So, you're stuck with it! All right; let's see how to connect it up.

ROM rattlers

If it's a ZX printer, an Alphacom, or a Floyd, then these are designed to use the Spectrum ROM routines LLIST, LPRINT and COPY. They will each fit directly into the Spectrum or Spectrum+, via the rear expansion port, although some might not easily fit every sort of add-on keyboard. For other printers, an *interface* and *cable* are required at extra cost — a point worth thinking about if you want only to LIST programs.

Why extra interfaces?

Standard printers expect information to be presented to them in standard fashion, and are designed for this. The information from the ROM PRINT and COPY routines fed out at the rear port is not in a recognised standard form. The ZX printer has a sort of built-in interface which allows it to interpret fluctuating signals as 'make a dot' or 'don't make a dot' (the Alphacom and Floyd can be said to emulate the ZX printer (hence the interface containing the chip) and properly organised (hence the software, which will, for instance, permit proper LLISTings of Sinclair Keywords).

There are two main sorts of add-on printer interfaces to fit a Spectrum because there are two main ways of sending information to a standard printer. The *parallel* (or *Centronics*-type) interface takes each byte and sends each of the eight bits *simultaneously* (i.e. in parallel) to the printer. The *serial* (or *RS232*-type) interface sends each of the eight bits *one after the other*.

Printers, in turn are sold set up to decode either serial information, or parallel information (or, occasionally, both) in other words, the printer is itself equipped with a serial or with a parallel interface. The majority of printer installations used to be set up for parallel transmission of information; however the swing is now tending towards serial. Nevertheless, many printers still come with a parallel interface as standard; a serial board will cost extra.

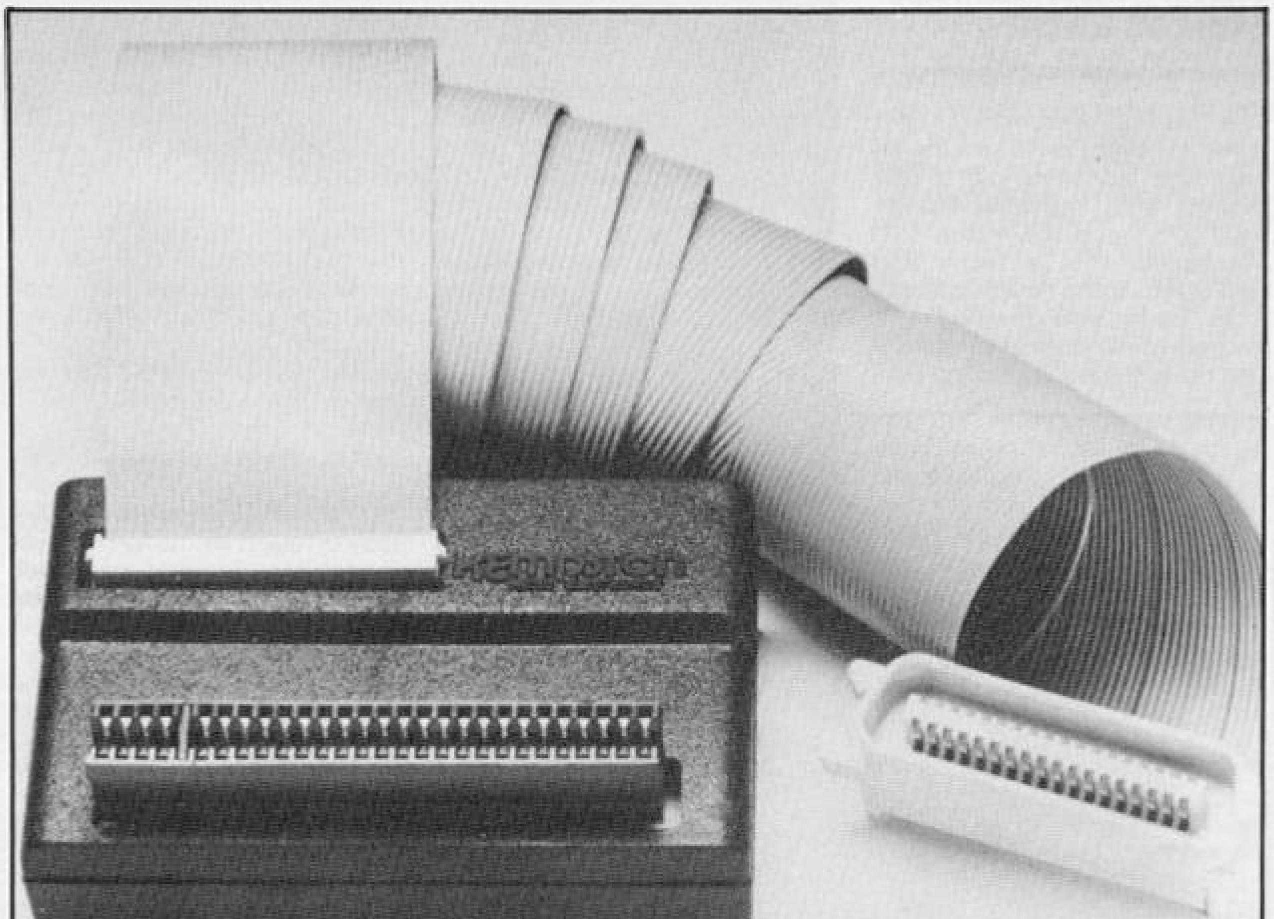
Interface 1

This bad news must be set against the good news that Sinclair's Interface 1 already has an *RS232* port suitable for printers on board. So if you already have Interface 1, you must balance the cost of paying extra for an *RS32* board on the printer and a printer cable against paying for a separate parallel interface to put on the outlet port of the Spectrum. Perhaps this is why there are so few other Spectrum *RS232* interfaces available; Euroelectronics ZXLprint III being the only common one; unusual in that the little box contains both serial and parallel boards, and that the relevant cables are sold separately. (And it's the ZX-LPRINT III that we use for printing listings and in word processing — Ed.)

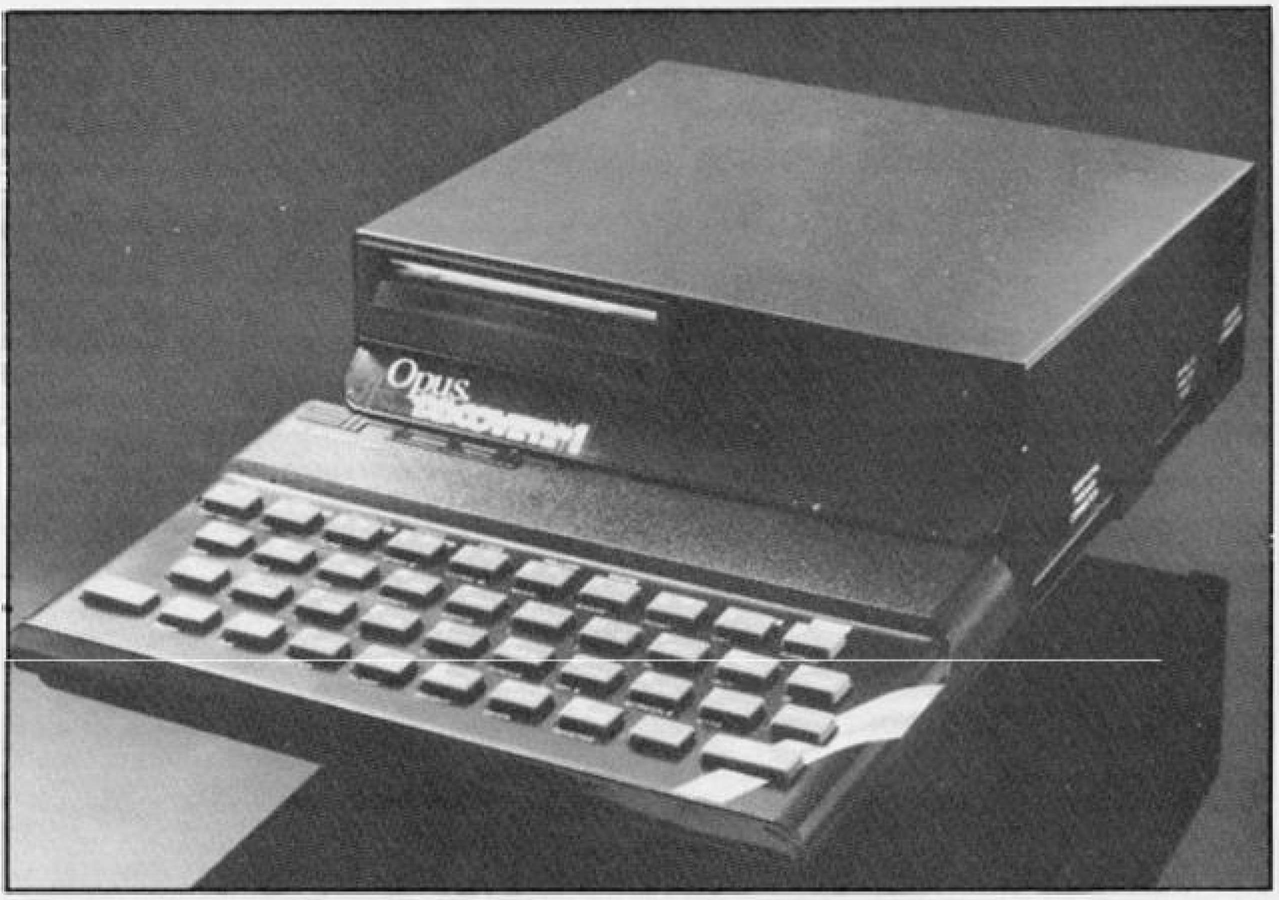
Parallel printing

Ah, but you bought the one with the parallel port, didn't you! Well, what make of interface are you going to buy, then? The choice is bewildering. At least a dozen, probably more. How does one make a rational decision?

There are two main sorts of



interfaces; in one sort the software is LOADed (e.g. from the cassette supplied), whilst the other has software on board on EPROM. Whilst in theory the cassette-based software must be fed in each time the printer is used, in practice this is not as bad as it loks: for instance, for writing text, Tasword II incorporates modifications for a range of interfaces; the POKEs are saved with the program. It's still necessary to LOAD software, though, for LLIST, LPRINT and COPY (various sizes). This is located in the printer buffer which NEW clears out — a bit of a bind sometimes.



Eprom for efficiency

Interfaces with an on-board EPROM are usually a little more expensive, but all you have to do is switch on and there it is. It cant be NEWed away, but there can still be certain problems. For instance, all ZX Basic's keywords are encoded by single ASCII codes or tokens which are decoded by the printer interface software so that programs are LISTed correctly; sometimes it is necessary to use ASCII codes to send other information to the printer, and sometimes this can't easily be done if the software decodes them all the time. In addition, certain Basic-augmenting programs, like Beta Basic and MegaBasic can present LISTing problems. Finally, to make big screen copies (A4) you need to feed in additional cassette-based software anyway.

Fitting in

Now the little box itself. First, for goodness sake don't just buy one without trying it for size. Some older interfaces will not physically fit the Spectrum+ and some will not fit an add-on keyboard, so check first. next, look at the design. Reject any interface which is flimsy or which has an edge connector which is not really good and tight, since poor connections can lead to loss of text or, at worst, loss of computer and interface! There are two main patterns, the upright box and the box which lies flat at the back. If you favour one of the latter, make sure that it does not need additional support, particularly if you use an add-on keyboard. If the interface is hanging out at the back, it may not crash the computer through a poor connection at the edge connector, but simply because it may have strained the Spectrum PCB, and put a micro-crack in one of the conductive tracks.

Is the price right?

Check the reviews, check the adverts. This last summer in a seaside chainstore, I saw an old model being offered as a special reduction; but it was still £10 dearer than the nationally advertised price of a replacement model! Oh, do make sure that the instruction leaflet and the cable are included in the little box.

If you are the perfect ignoramus (join the club), take the printer *and Spectrum* to the local micro-shop (preferably not chain-store). Their prices will probably not be the cheapest, but you are likely to get specialist advice ensuring that you are aided satisfactorily. Alternatively, for the bargain prices, order by mail-order.

Cunning combinations

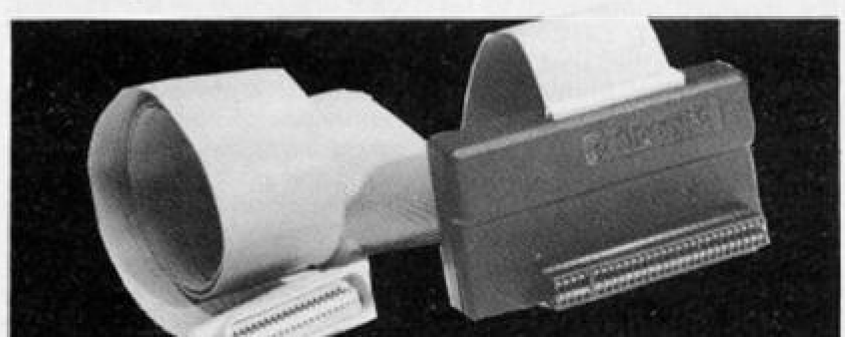
If you are lucky enough to have a rich uncle, he might be conned into getting you a combinaton deal, like the Rotronics Wafadrive, which comes with both parallel and serial interfaces on board, or a Discovery disc unit, which incorporates a parallel port. Both these units suppoty LLIST and LPRINT. Wafadrive comes with Spectral Writer, (a word-processing program), and incorporates appropriate text-printing interface software. With Discovery it's even easier: just enter the command **OPEN #3;"b"** (for instance, insert this at the start of line 15 in Tasword II) and you're away. Oh, and do, at some stage, mention your rich uncle that you will need (at extra cost) a printer cable.

So, what can go wrong?

Firstly *never, ever, connect or disconnect your Spectrum to the interface of the printer with the power on.* Switch off first. If you pull the Spectrum and interface apart whilst they are powered up, you can (and probably will) blow them both. Thus, interface-wobble is bad news: avoid it. A crashing Tasword *can* be caused by dirty or loose connections. Continued crashing from this cause will damage the health of your computer and interface. Power down, check that the D-plug to the printer is tight, and clipped in if clips are provided. Check that it doesn't wobble. Check that the mains plugs are in order, that, if a mains adapter is used, it is satisfactory (without wobble) and that the Spectrum power supply is properly plugged in at both ends. The socket can often be loosened on the Spectrum printed circuit board. Check that the cable-interface connection is good.

Some interfaces use a pin connector; some (e.g. Discovery), use an edge connector like the Spectrum edge connector. Dirty edge connectors can be cleaned with an ink eraser provided there is still metal there! Make sure that the interface connector is not fouled by the Spectrum heat sink, (the aluminium strip); it must go right home. If trouble persists, then get your local micro shop to run a test on the gear.

Good luck with your endeavours — and Happy Printing! ■



Epson Meets The Spectrum

R.G. Luxton thought his troubles were over when he got an FX80 — here he explains the pitfalls.

When I retired my faithful ZX thermal printer in favour of a shining new Epson FX80 dot-matrix printer, I fondly imagined that all my troubles would be over, and that I would simply have to press a key or two in order to have lots of different typefaces and other printing tricks at my command.

How wrong I was!

The Epson does supremely well all that is claimed for it, and my Kempston E Centronics interface, which has a built in Eprom and occupies no space in RAM, remains permanently attached to the back of the Spectrum, quietly going about its business. What I did not know was that a knowledge of Control and Escape codes was essential to use the many functions of the printer and that some hard study of the FX80's operations manual would be needed.

The Spectrum uses single byte tokens for keywords and the Kempston interface will interpret the tokens to print out the full keywords during LLISTing. This however, can confuse the printer so the Epson's control codes must be entered with the keywords OFF. To switch OFF the tokens, **COPY : REM CHR$ 0** is entered as a direct command. Similarly, **COPY : REM CHR$ 1** is entered to switch them on.

I soon found that the Escape and Control codes worked as printed in the manual if I put the codes in Basic lines and set the token switches OFF with a direct command. Thus: ESC SO, the Enlarged mode setting requires **LPRINT CHR$ (27); CHR$(14);** to be sent to the printer in order to print enlarged characters.

Symbol shift

A snag become evident however, when I tried to LLIST program listings containing the '£' and '#' symbols. The FX80 allows you to download any one of nine different character sets for the USA, France, Germany, England, Denmark, Sweden, Italy, Spain and Japan, each of which, in addition to an alphabet, numbers, etc, contains a number of unfamiliar characters applicable to that country's alphabet.

In all of the sets except those for England and Spain, the code 35 symbol is '#'. In the English set, code 35 is the '£' sign. Thus, if you call the English set (No.3) by inputting **LPRINT CHR$(27);"R";CHR$(3);** then the Epson will faithfully print every '£'. But what do you do if you want to print BOTH £'s AND #'s within the listing?

(Have you noticed how many magazines print listings for Spectrum programs using an *italic* bracket, or the '£', in place of the '#'? Presumably their printer dumps have similar troubles?).

In an ordinary Basic program, it would be simple to call backwards and forwards between say, the German set, with its code 35(#), and the English set code 35(£), but this would not do for LLISTing. It was then that I discovered the ESC 6, 'Printable Code Area Extension' in the manual, which had obviously been designed for such use. This allows 33 extra characters — Spanish, Japanese etc — to be loaded into code numbers that are not normally used, thus code 134 is the '£' character. For this you enter, **LPRINT CHR$(27);"6";** followed by a call for the character you want printed, thus: **LPRINT CHR$ 134** for the '£' sign.

It became obvious then that a program would be needed to set up the printer and do all the switching necessary to call the options required to LLIST with correct printing of the '#' and '£' characters. But, if these were contained in just a few lines to MERGE at the end of a program to be LLISTed, then the printer got confused, so that some care would have to be taken switching the tokens ON and OFF.

LLIST

With software-driven printer interfaces simple Pokes are sufficient to switch tokens on and off, but this does not work with the Kempston E! However, I found that putting the required **COPY:REM CHR$ 0 (or 1)** into a Basic line works, and the Spectrum even reads the **CHR$** instruction AFTER the REM (which it should not do), but that adding a colon and another instruction on the same line will not work!

The simple answer was to put the switching commands on a line of their own, as in lines 9995 and 9997 of my program, the **LLIST**, and **RETURN** instructions also on separate lines, but I would still like to know why the Spectrum will perform instructions *following* a REM in some cases and not in others!

LLIST, merged on to the end of any program for Listing, and run by a direct command — **GOTO 9985** — works for me, and would probably require very little adjustment to make it work equally well for any similar printer interfaced to the Spectrum, even with a different interface.

Extra care should be taken in typing it in as some of the syntax is unusual. The colons are essential and the **CHR$ (27); "E";** in Line 9999 sets the printer for **emphasized** Pica face, but can be changed as required.

Tasword

This routine will take care of the LLISTing problem, but even the superb TASWORD II word processor program is not without its troubles. On my Epson FX80, the DIP switch pins SW 1-6, SW 1-7 and SW 1-8 have been set ON, OFF and OFF, which automatically downloads the ENGLAND International Character Set with its '£' as character 35, along with other characters specific to that set. This is fine if I want to print the

How Does LLIST work?

s =	23755
FN a( ) =	(23759) Start of first program line.
FN b( ) =	(23770) Remainder of the line.
Fn c( ) =	Current line number. (s & s + 1).
Line 9986	If next line = start of this routine, then stop.
9987	Sets up printing format and starts j FOR/NEXT loop.
9988	If j = '#' (Code 35), (which would not print thus!) then LLPRINT '#'
9989	If j = '£', (Code 96), (which would not print thus!) then calls ESC 6. Printable Code Area Extension and LLPRINT CHR$ 134 ('£').
9990	If j = 'OPEN #' (Code 211), (which would not print thus!) then LLPRINT 'OPEN #'
9991	If j = 'CLOSE #' (Code 212), (which would not print thus!) then LLPRINT 'CLOSE #'
9992	If J = 32, then LLPRINT it! Below 32 is not printable.
9993	CHR$ 14 signifies a numerical constant in the line, followed by five bytes for the number itself, so do not LLPRINT them!
9994	Continues with the remainder of the line.
9999	Sets variables. The first sets Epson FX80 for Emphasised pica face ('E') and can be changed as required.
IMPORTANT:	'OPEN £' in line 9990 and 'CLOSE £' in line 9991 *MUST* be entered using *individual* letters. Spectrum keywords will not work with £.

'£', but in this set there is no '#' (which is character 35 in most of the other international character sets)!

A little study of the program printer control codes shows that Graphics character 128 is programmed with numbers 27, 112 and 48, while character 143 has 27, 112 and 49. This means that using GRAPHICS 8, (Code 128), Escape code 27, and 'p' (Code 112 — for the Epson proportional spacing mode), is sent to the printer, followed by '0' (OFF). In other words, GRAPHIC 8 sets 'Proportional spacing' to OFF, while GRAPHIC/SHIFT 8, (Code 143), Escape code 27, code 112 ('p'), and code 49, ('1'), sets it to ON.

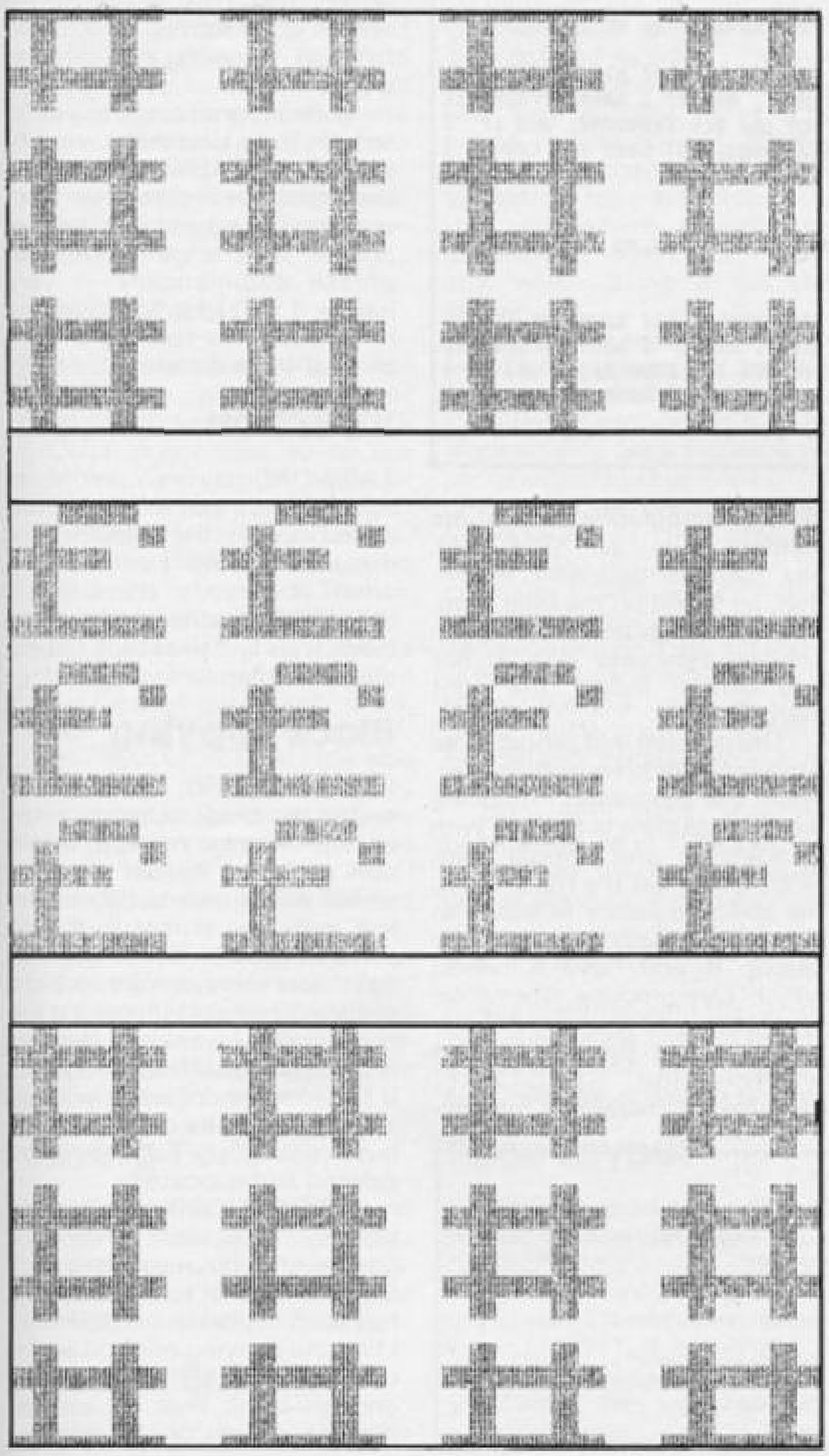
I decided that proportional spacing was an option that I could do without, so I simply reprogrammed character 128 with 27, 82 and 3, and char 143 with 27, 82 and 2, which are the codes for Escape code 27; 'R' (code 82), the Epson International character set selection, with '3' for the English set and '2' for the German version.

Now, to print '£' I simply type in the '#' key, but to obtain the hash, I type in GRAPHIC/SHIFT 8, #, GRAPHIC 8.

The Kempston E interface requires the tokens to be switched OFF before loading Tasword **COPY:REM CHR$ 0)**, and if the dip switch No.2 (SW pin 2-4) in the Epson printer is set on, then line feeds are automatic. The Tasword Printer Linefeed should be set to '0', and the Printer Carriage Return to 13.

The Spectrum manual, page 166, explains how Basic program lines are constructed.





```
9985 GO SUB 9999
9986 IF FN c()=9985 THEN  LPRINT
 : STOP
9987 LPRINT TAB 1;("  " AND FN c
()<=9)+(" " AND FN c()>=10 AND F
N c()<100);FN c();: FOR j=FN a()
 TO FN b()
9988 IF PEEK j=35 THEN  LPRINT "
£": NEXT j
9989 IF PEEK j=96 THEN  GO SUB 9
995: LPRINT CHR$ (27);"6";: LPRI
NT CHR$ 134;: GO SUB 9997: NEXT
j
9990 IF PEEK j=211 THEN  LPRINT
" OPEN £": NEXT j
9991 IF PEEK j=212 THEN  LPRINT
" CLOSE £";: NEXT j
9992 IF PEEK j>=32 THEN  LPRINT
CHR$ PEEK j;
9993 IF PEEK j=14 THEN  LET j=j+
5
9994 NEXT j: LET s=FN b()+1: GO
TO 9986
9995 COPY : REM CHR$ 0
9996 RETURN
9997 COPY : REM CHR$ 1
9998 RETURN
9999 GO SUB 9995: LPRINT CHR$ (2
7);"E";: LPRINT CHR$ (27);"R";CH
R$ (2); GO SUB 9997: LET s=23755
: DEF FN a()=s+4: DEF FN b()=s+3
+PEEK (s+2)+256*PEEK (s+3): DEF
FN c()=256*PEEK s+PEEK (s+1): RE
TURN : REM "E"(line 2) is for EM
PHASIZED print. Change as requir
ed.*"LLIST"(c)R.G.Luxton*
```

Tasword or Spectral?

Carol Brooksbank has been using both wordprocessors for some time now and gives some advice to those about to venture into this field.

If you are thinking of buying a word processor program for your Spectrum, you could find yourself trying to choose between TASWORD 2 and SPECTRAL WRITER. The programs are very similar. Both are superb word processors, packing some very impressive features into a small enough space to leave room for over 300 lines of your creative genius in the Spectrum's memory. But there are small but important differences, and to choose the one that will suit you best, you need to know what the differences are.

In this article, I am concentrating on those differences, and not describing operations which are common on both if the only difference is the key pressed to perform the operation. Both programs perform all the basic functions to allow you to enter, correct, print, SAVE and LOAD text. The differences are in the extra features. Some you may think vital, some you will probably have no use for. The final choice will depend on your own preferences, and the sort of work you do.

Screen Display

Both programs display the text on screen as it will be printed, with 64 characters per line. the special typefaces they use for this are slightly different, (Fig. 1), and you may find one more readable than the other. If it helps you to decide, I prefer SPECTRAL, my husband likes TASWORD! In fact, both are perfectly readable, but TASWORD also has a 'window' feature to allow you to see the text full size if you have difficulty reading the condensed print. (Though this is a feature I have never needed to use.)

Fig. 1. 64 COLUMN SCREEN DISPLAY

```
This is a test piece, to show the screen display of TASWORD 2.

If I speak in the tongues of men and angels, but have not  love,
I am a noisy gong or a clanging cymbal. And if I have  prophetic
powers, and understand all mysteries and all knowedge, and if  I
have all faith, so as to remove mountains, but have not love,  I
am nothing.


This is a test piece to show  the  screen  display  of  SPECTRAL
WRITER.

If I speak in the tongues of men and angels, but have not love.
I am a noisy gong or a clanging cymbal. And if I have  prophetic
powers, and understand all mysteries and all knowledge, and if I
have all faith, so as to remove mountains, but have not love,  I
am nothing.
```

TASWORD is displayed with black print on white screen. SPECTRAL is cyan on blue, which appears white on black on a monochorome TV, but there is a menu option for changing the screen colours to suit yourself, and you can incorporate the colour changes into a backup copy of the program if you want to make them permanent.

Text Capacity

TASWORD, 320 lines of text, SPECTRAL, 350 lines.

Tabulation

TASWORD has no tabs, but does have adjustable margins. These can be used to produce indented paragraphs which are justified, (Fig. 2). SPECTRAL has full user-definable tabulation, as found on the best typewriters, which makes typing in columns very easy, (Fig. 3), but you cannot indent the right margin.

This feature will probably be a major factor in your choice between the programs. Producing work in columns is tedious with TASWORD and simple with SPECTRAL. On the other hand, the ability to justify to less than the 64th column can be very useful. If you have a printer which can produce alternative typefaces, you will have difficulty with larger than usual ones when using SPECTRAL, because 64 characters may occupy more than 1 line on the paper, making a nonsense of the justification and word-wrap. (Fig. 4). You can overcome this with TASWORD by indenting the margins, reducing the columns per line. (Fig. 5).

Fig. 2. TASWORD INDENTED PARAGRAPHS.

```
This first paragraph is typed with the  full  width,  64  column
margins as set when the program is loaded. The  paragraph  below
is typed with the left margin set at 7, and the right at 58.

      If I speak with the tongues of men and  angels,  but
      have not love, I am  a  noisy  gong  or  a  clanging
      cymbal.  And  if  I  have  prophetic   powers,   and
      understand all mysteries and all knowledge, and if I
      have all faith so as to remove mountains,  but  have
      not love, I am nothing.
```

Search facilities

Both programs use the 'arrow' keys to move the cursor one letter or one line in any direction, but TASWORD also allows you to move the cursor back or forward one word at a time for rapid movement. SPECTRAL has very fast repeat, so that although the cursor moves one letter or one line at a time, if the key is held down continuously the movement is much more rapid than TASWORD's word jumping. The repeat speed may be altered by the SPECTRAL user if required. SPECTRAL also allows the cursor to be moved to the next full stop — moving a sentence at a time.

Both programs allow you to search for a particular word or phrase, but TASWORD also has the facility to replace every occurrence of a particular word or phrase with another word or phrase automatically — very handy if you discover that you have been mis-spelling a word throughout a document.

Insertion

TASWORD has an Insert Mode which allows you to insert extra sentences in the middle of a document without over-writing what is already there. With SPECTRAL you must first insert blank lines and then type the additions in them.

Block Copying

With TASWORD, the start and end of the block to be moved or copied must be marked, and it can then be moved to lines which will be inserted above the line with the cursor in it. For some reason, I never get this right, and always have to have several attempts before I get the block where I want it — but that is just a personal incompetence. If the block is copied, it will still also appear in its original place, but if moved, the original will be deleted and relocated.

SPECTRAL only copies text blocks. If you want to move a paragraph you must delete it from its original location after it has been copied to the new one. I find the copying method easier to handle, though. You insert enough blank lines to accommodate the block where you

Fig. 3. SPECTRAL TABULATED TEXT

```
ORG 71AF
71AF  CDA371   ROOM CHK   CALL 8W
      CDA22D              CALL FP TO BC
      3A015B              LD A,(5B01)
      6F                  LD L,A
      2600                LD H,00
      AF                  XOR A
      ED4A                ADC HL,BC
      01FF00              LD BC,00FF
      AF                  XOR A
      ED42                SBC HL,BC
      300D                JRNC NO ROOM
      CD9C71              CALL 8H
      47                  LD B,A
      AF                  XOR A
      3A025B              LD A,(5B02)
      90                  SUB B
      3802                JRC NO ROOM
      A7                  AND A
      C9                  RET
      37       NO ROOM    SCF
      C9                  RET
```

want to put it, and specify that the block starting line, and ending line, is to be moved to a position starting line. If you have not left enough blank lines to receive the copied paragraph, you get an 'overlapping error' report, but the text is not overwritten.

Justification

Both programs allow for automatic word-wrap or justification to be turned on or off, for single lines to be unjustified, and single lines or paragraphs to be justified. SPECTRAL has an extra facility, in that the whole text-file can be un-justified or justified. The latter needs approaching with caution, because every line is justified, including headings and short end-of-paragraph lines, which gives some very odd effects. With SPECTRAL, it is also possible to centre unjustified text in the page, move it to the left margin or move it to the right margin, though I confess that I have yet to find a use for this facility.

SPECTRAL has a 'bell' — a beep which sounds near the end of a line, which is handy if text is being entered without word-wrap, or justification, using the program like a typewriter.

Saving Text

With TASWORD, the whole text file is SAVEd. Spectral allows the user to specify that only certain lines of the text are to be SAVEd if required.

Printer Controls

TASWORD comes with the graphics keys (G-mode keys 1-8) defined as printer controls which suit Epson printers. The user can re-define these if required, either to suit another printer, or to change the controls available. These are entered into the text where required for underlining, bold type, italics etc. when using a full size printer.

SPECTRAL uses the graphics keys in the same way, but they are not pre-defined, and the user must define each one to his own requirements before making the personalized backup copy of the program. One drawback with SPECTRAL — the program recognizes '0' (zero) as a null code, so codes which include CHR$ (0) cannot be used. With an Epson printer there are usually alternatives which use other codes, but this could be a problem with other printers. TASWORD recognizes '0' as CHR$ (0).

With SPECTRAL, it is also possible to send a line feed or form feed instruction to the printer direct from the keyboard.

ZX Printer

Both programs send text to the ZX printer in 64 column format. TASWORD will also print any specified line at double height.

Page Layout

TASWORD allows the user to specify the line spacing, but has no facilities for page numbering or heading. SPECTRAL has no line spacing facilities, so double line spacing must be entered as a printer control. However, SPECTRAL has very valuable page numbering facilities. Pages may be numbered or unumbered, the starting page number to be specified by the user if it is a value other than '1'. If the pages are numbered, mode 1 will print the numbers at the top right hand corner of each page, whilst mode 2 may be selected if the numbers are required to alternate between the top left and top right corners to facilitate binding. SPECTRAL allows a page heading of up to 32 characters to be printed if required, which will be printed on the side opposite the number. Control characters may be used if this is to be underlined, or in bold type, etc.

SPECTRAL also allows the user to specify the margin width and the number of lines on a page before a form feed is executed. The default values, which operate unless the user changes them, centre the text on the 80 column page, and give 60 lines per page. To change the margins or centre the text with TASWORD, you must use printer controls to set the left margin. On the whole, SPECTRAL's printing facilities are more versatile than TASWORD's.

Printing Part of Text

TASWORD will print from a specified line to another specified line. SPECTRAL will print from the cursor to the end of the text. If only a centre section is to be printed with SPECTRAL, the cursor must be placed at the starting line, a form feed printer code entered at the end of the portion to be printed, and the printing operation stopped manually when the required section has been printed. Alternatively, a selected portion can be SAVEd separately, and the section LOADed in place of the full text before printing. Text written using TASWORD and saved on tape may be loaded into SPECTRAL. The reverse is only possible if the text is shorter than 320 lines.

Supplementary Programs

The TASWORD user with a Microdrive can obtain a program called TASMERGE which allows text produced with TASWORD to be combined with data stored using the Campbell MASTERFILE program, to produce personalized circular letters etc. There is also the TASPRINT program, which produces alternative type fonts with suitable full-size printers.

There are, at present, no supplementary programs for SPECTRAL, though thre have been rumours of plans to produce a merging program.

TASWORD has an efficient customer backup service, and esoteric queries are answered rapidly and helpfully. The only letter I have ever written to Softek, the publishers of SPECTRAL, was not answered, but Rotronics, the manufacturers of the Wafadrive storage system, will handle queries about SPECTRAL and they have issued a leaflet giving listings for an upgraded version.

The upgrade gives several improvements to SPECTRAL's printing. Parameters such as page numbers, margin width and number of lines per page are selected at print time, instead of going first to another menu option. The printer controls are improved, so the program now recognises CHR$ (0), and there is a multiple copies option. You can also elect to pause the printing operation at the end of each page to allow for changing paper when using single sheets.

In addition, a bug is removed from the program and there are improvements to some of the menus. For instance, the directories are displayed when loading or erasing a Wafadrive file. The 'save program to wafer' option is improved so that the program loads much more quickly. The listing, 'Upgrading Spectral Writer' is available from Rotronics for 70p or for £1 you may send your original copy of the program to Rotronics who will upgrade it for you. The listing is three pages of BASIC plus a number of POKEs, so the extra 30p to have it done for you seems good value.

Which to chose? It really is a personal choice. My own preference is for SPECTRAL, because the type of work I do makes the tabs, the page numbering and heading and the page layout facilities very useful, but I know that others prefer TASWORD. I hope that this article will at least help you to choose the one which will suit you best.

Xtending VTX5000 BASIC

David Knight presents a way of making Prestel more user friendly!

The program supplied in ROM for the VTX 5000 modem is very good, but it does not have any microdrive or Interface 1 commands. I have written a program, which, when MERGED with the program supplied, allows you to use the Microdrive and RS232 socket on the Interface 1. I will explain the modifications later.

First, type in the Xtend program, omitting lines 5000 & 9780 if you do not have a printer attached via the RS232 socket, or if you wish to use the ZX Printer instead. Save the program with GO TO 9820. Now, switch the computer off and on at the mains, to place the Micronet menu in memory. Press any key to go the main menu, and press BREAK (Caps-Shifted SPACE). Now enter your 'prestel' cartridge into microdrive 1 and type **MERGE ✱;1;"Xtend"**. This will make all of the changes needed to the program. Save the whole program with GO TO 9800. You should use a cartridge without the filename 'run' on it.

In order to use your new program, after switching on, press any key and then 'BREAK'. Now type 'NEW' on key 'A' and ENTER. Do NOT use option 7 on the menu, as this clears the machine code from memory. Now enter your Prestel cartridge into microdrive one, and type "RUN" (ENTER). The program will autorun.

Catalogue

With the new program, a few changes have been made apart from just saving and loading on microdrive instead of on tape. Most obvious is the 'Catalogue/erase file(s)' option on the main menu. To use this place a cartridge in microdrive 1 and press any key. It will be catalogued. Then you have the option of erasing files. Once you have erased all of the files you need, press ENTER without any filename, and the cartridge will

Figure 1. The Xtend program.

```
 798 REM Extended Prestel menu
 799
 800 POKE 23609,10: PAPER 1: BOR
DER 0: INK 7: LET mn=o: GO SUB d
m: GO TO mc
 900 DATA "Main Prestel Menu",9,
10,"Log ON or OFF","Prestel Term
inal","Save Frame","View Frame",
"Print Frame","Downloader","Mail
box Message","Enter BASIC","Cata
logue/erase file(s)"
2997
2998 REM MDV save
2999
3000 GO SUB 3100: GO SUB 4220: S
AVE *"m";1;q$CODE ix-960,960: GO
 TO mm
3100 GO SUB cl: INPUT "Catalogue
 ? "; LINE z$: IF z$="y" THEN P
RINT AT 0,0;"Input cartridge and
 press a key.": PAUSE 0: PRINT A
T 0,0;"
      ": CAT 1
3110 INPUT "Filename ? "; LINE q
$: RETURN
4197
4198 REM MDV load
4199
4200 GO SUB 3100
4210 LOAD *"m";1;q$CODE : GO TO
4100
4220 INPUT "Erase first ? "; LIN
E z$: IF z$="y" THEN  ERASE "m";
1;q$
4400 RETURN
4997
4998 REM Printer RS-232
4999
5000 POKE mf,16: LET x=USR str:
GO SUB 9730: GO TO mm
7300 GO SUB 3100: GO SUB 4220: S
AVE *"m";1;q$ DATA b$(): GO TO 7
000
7400 GO SUB 3100: GO SUB 4400: L
OAD *"m";1;q$ DATA b$()
9100 GO SUB cl: GO SUB er: RESTO
RE (1000*mn+900): READ m$: PRINT
 TAB ((32-LEN m$)/2); PAPER 7; I
NK 2;m$'': READ ni,os: PRINT " K
EY   FUNCTION"'': FOR i=o TO ni-
1: READ m$: PRINT TAB (1+1);i;TA
B (7);m$'': NEXT i: PRINT #0; IN
VERSE 1;"ENTER"; INVERSE 0;"  GO
TO Main Menu": LET l$=CHR$ 17+CH
R$ 2+" ON": IF ls=o THEN  LET l$
=CHR$ 17+CHR$ 4+CHR$ 16+CHR$ o+"
OFF"
9330 IF key>47 AND key<(48+ni) T
HEN  GO TO (100+mn*1000+900*(mn=
o)+os*100*(key-48))+(700 AND key
=CODE "8")
9335 IF key=56 THEN  GO TO 9700
9697
9698 REM Erase / Catalogue
9699
9700 CLS : PRINT "Press a key wi
th cartridge in   microdrive.":
PAUSE 0: CAT 1
9710 INPUT "Name file to erase (
just "; INVERSE 1;"ENTER"; INVER
```




```
SE 0;"  to go to Main Menu) ";z$
: IF z$="" THEN CAT 1: PAUSE 0:
 GO TO mm
9720 ERASE "m";1;z$: GO TO 9710
9724
9725 REM Printout through RS-232
9726
9730 CLOSE #3: OPEN #3;"b": FOR
a=ix-960 TO ix-1 STEP 40
9735 FOR c=a TO a+39
9740 LET b=PEEK c
9750 IF b<32 OR b>127 THEN  LET
n=32
9760 LPRINT CHR$ b;
9765 NEXT c
9767 LPRINT CHR$ 13;CHR$ 10;
9770 NEXT a
9780 RETURN
9797
9798 REM Save updated BASIC
9799
9800 ERASE "m";1;"run": SAVE *"m
";1;"run" LINE 800: VERIFY *"m";
1;"run": REM Change "run" to "ru
npr" if using autorun program.
9810 GO TO 800
9817
9818 REM Save Xtender program
9819
9820 ERASE "m";1;"Xtend": SAVE *
"m";1;"Xtend"
```

be catalogued again. Then it will return to the main menu.

When loading or saving, you are given the option to catalogue the cartridge before loading (or saving). When saving you are given the option of erasing any file with the same filename before saving the current file. This is similar with both screen files and mailbox messages.

If you wish to load a file from tape, you may BREAK into the program, and type **LOAD ""CODE**. Then type **GO TO mm**.

The final change is for users with a full sized printer attached via the RS232 port. (I use a Brother M-1009, but the program should work with other makes). It changes option 4 from copying to the ZX Printer to copying to a full-sized printer. it is not perfect, however, as it will print block graphics as jumbled characters. If this is unsatisfactory for your needs, insert your own copier from line 9700 onwards. It is perfectly adequate for printing pages of information, but not for copying pictures.

My current Prestel cartridge contains Omnicalc 2, and the extended BASIC. This makes it possible to enter data into Omnicalc after getting it from Prestel. This is ideal for stockbroking etc — If you have Omnicalc 2 you may wish to do this. To start with, you must copy Omnicalc onto cartridge (not using their method, however, as it uses the filename 'run'). Copy it with one of the tape/microdrive copiers available, preferably with the filename 'runot'. I use Trans Express by Romantic Robot, but any other should so. The Prestel extended menu should be saved under the name 'runpr'. To do this, change line 9800 appropriately and GO TO 9800.

Type in the 'autorun' program and save it under the name 'run' LINE 0. Now you can use the Prestel menu the same way as before, except that you should choose option 2 when the autorun program loads.

Options

The full options are as follows: 1 — Load extended Prestel menu: 2 — Load Omnicalc 2: 3 — Set printer to condensed mode: 4 — NEW.

Options 1, 2 and 4 explain themselves, option 3 sets a dot matrix printer into 'condensed' mode, allowing 16 columns of data in Omnicalc 2 to be printed. this, I know to be true on a Brother M-1009, but may be different on other makes. I find that Omnicalc's Open 3 command is unsatisfactory, as it opens channel 3 in 'b' mode, which does not line feed on my printer. It is necessary to set the bit switches differently inside the printer, which is a bit sloppy. Option 3 corrects this, and allows wider texts to be printed. However, if you switch your printer off while in Omnicalc, it will be reset to pica sized characters, so you will not be able to use condensed mode until you reload Omnicalc.

To get round this, load Omnicalc, and set up a file. When you wish to print it, save the file and reload Omnicalc, this time setting the printer to condensed mode. You may now print it out, in sections if necessary. This autorun program may be expanded upon to load other programs other than Omnicalc, such as Tasword 2. The Prestel menu may also be further expanded upon, so do not be afraid to do so. But you need a knowledge of BASIC and perhaps machine code. I look forward to seeing further projects in this magazine and in others.

Figure 2. Autorun program.

```
  10 BORDER 4
  20 FOR a=0 TO 31: PRINT AT 0,a
; INK 2;"█";AT 21,a;"█": IF a<21
 THEN  PRINT AT a,0; INK 2;"█";A
T a,31;"█"
  30 NEXT a
  40 INPUT ""
  50 PRINT AT 4,4;"Prestel   Car
tridge"; OVER 1;AT 4,4;"_________
__________ _"
  60 PRINT AT 6,4;"Press key 1,
2, 3 or 4";AT 9,4;"1 Prestel ext
ended menu";AT 11,4;"2 Omnicalc
two";AT 13,4;"3 Set printer to C
ondensed";AT 15,4;"4 Return to B
ASIC (NEW)"
  70 LET a$=INKEY$
  80 IF a$="" THEN  GO TO 70
  90 IF a$="1" THEN  LOAD *"m";1
;"runpr"
 100 IF a$="2" THEN  BORDER 7: L
OAD *"m";1;"runot"
 110 IF a$="3" THEN  CLOSE #3: O
PEN #3;"b": LPRINT CHR$ 15;: CLO
SE #3: OPEN #3;"t": POKE 23728,2
55: POKE 23729,255
 120 IF a$="4" THEN  NEW
 200 GO TO 70
9000 ERASE "m";1;"run": SAVE *"m
";1;"run" LINE 0: VERIFY *"m";1;
"run"
```

■

Tasword plus.

John Wall shows how to add Wordcount, Paragraph-count and Header facilities to Tasword II.



Word Count

Tasword Two has rapidly become the standard Word Processor for the Spectrum and has most of the features that purpose built WP's have. two features that are missing however are a current word count and automatic header.

This is a machine code routine that gives, in a fraction of a second, the number of words typed into the file up to present. Controlled from BASIC, it also gives a paragraph count.

The main problem is where to put the code. In Tasword Two the text file is held between 32000 and 52480 with an extra 128 bytes after that obviously used for overflow routines. The machine code section is held from 54780 to 65535. However, the machine code also uses bytes lower than 54780 for data storage. I chose 52610 as an address as far as possible from the data section of the machine code routines and no problems have arisen. The main disadvantage is the extra time the program takes to SAVE and LOAD, perhaps another 10 seconds each for the basic and the machine code.

The machine code routine involves only relative jumps. You might be puzzled by the 256 that is added to the DE register initially. This is so that the test for the end of the text file is simplfied. Just before the end is reached DE will hold 00 01 (hex — least significant byte first) and the next decrease of DE will leave FF 00 (255 decimal) and the D register will hold zero and the routine will return to basic. The word count is held in the BC register so that the command PRINT USR 52610 will return the actual count (See lines 60 and 9360). The code could be made shorter by omitting the CORRECT FOR END OF LINE ERROR routine. However this would give a false count because the routine would not separate two words one of which ends at column 64 and one which begins at column 1 of the next line. There is a brief explanation of the code in figure 1.

Header Routine

This enables the recall of a pre-entered address heading of up to seven lines. It also pushed down the entered text so that the heading does not overwrite it. There is a facility from BASIC to chage the heading at any time. The header information is stored between 52660 and 53107 — 448 bytes or seven lines of text — and the code to manipulate it is from 53110 to 53145. The code is three, almost identical, block transfer routines of 12 bytes each. The first is described in figure 2.

The second routine has the values in HL and DE interchanged. The third routine moves the already entered text seven lines down and uses the LDDR instead of LDIR.

The Basic at lines 9000 — simply calls the three routines in the right order. Routine three moves the text, then routine one prints the header. Routine two is used when a new or edited header is needed. See lines 9010 and 9040.

▶ ▶ ▶ ▶ ▶ ▶

Figure 1. the machine code routine.

INITIAL CONDITIONS		
Word count set to zero		LD BC, 00 00
File length + 256 20,736		LD DE, 51 00
File start address 31,999		LD HL, 7C FF
CHECK IF NEXT BYTE IS NOT A SPACE		
Select next byte	a	INCL HL
How many bytes to go?		DEC DE
CHECK IF FINISHED		
Have we reached the end of the file? Is the most significant byte of DE zero? If so return to basic.		LD A, 00 CP D RET Z
Is this byte a space? If so try next byte.		LD A, (HL) CP 20 32 dec = space JR, Z next byte (a)
INCREASE WORD COUNT		
If not a space then must be start of new word. Increase word count by One.	b	INC BC
LOOK FOR END OF WORD		
Select next byte of word.	c	INC HL
How many bytes to go?		DEC DE
CHECK IF FINISHED		
Have we reached the end of the file, Is the most significant byte of DE zero? If so return to basic.		LD A, 00 CP D RET Z
CORRECT FOR END OF LINE ERROR		
Is this the end of a line?		LD A, 3F (63) AND L CP L
If not continue with next byte of word.		JR NZ, d
If last byte of line then check next byte — first of next line.		INC HL LD A, (HL) CP 20 DEC HL
If next byte is a letter then go to word increase.		JR, NZ, b
If this byte is not a space then try next byte of word.	d	LD A, (HL) CP 20 32 dec = space JR NZ, c
If END OF WORD GO TO START		
If this byte is a space look for next word.		JR, a

Figure 2. Block transfer routine.

Load HL with address of first byte to be moved:	LD HL, CD B4 (52660)
Load DE with address of destination:	LD DE, 7D 00 (32000)
Load BC with length of block:	LD BC, C0 01 (448)
Use LDIR	LDIR
Return to BASIC:	RET

Basic Modifications

Modifications are required to Tasword Basic. There is not much spare room in the Basic area with Tasword loaded so some preliminary work has to be done. All the numbers in lines up to 1000 must be changed to VAL "number".

Provision must be made to display the information. One item on the STOP MENU has been changed and one has been added. Instead of "back to basic" there is "heading (for a letter)" and then "word count" has been added at the bottom of the menu.

1. Load Tasword in the normal way.

2. Edit every line to 1000 replacing numbers with VAL "number". Note that this doesn't apply to numbers in strings e.g. PRINT "2 — fix heading as typed", or numbers in variables e.g. j1, or initial line numbers but it does apply to GOTO and GOSUB line numbers. Each time you do this you save three bytes. You can check how much memory you have saved by typing in line 9990 and using GOTO 9990 every now and then. The new Basic requires over 1000 bytes of extra space. If you need Microdrive routines you will need to make even more space by using VAL "number" right through the program.

3. Add or modify the lines as shown in the listing, making absolutely certain that the numbers in lines 9810 and 9820 are EXACTLY as printed, as a single error could crash the entire program.

4. Type GOTO 9800 and ENTER.

5. Now delete lines 9800 to 9990.

6. Save your new program on tape (or Microdrive) by using SAVE "tasword" LINE 15: SAVE "tasword" CODE 52610,12925 (or similar M/Drive commands).

7. Check that the program saved properly by VERIFYing it. Use VERIFY "":VERIFY ""CODE.

The machine code is automatically called each time you go to the menu via SYMBOL SHIFT/STOP and again using option 't'. If you have made any mistakes at all then the program will crash and you will have to start again. Due to this it might be better to save the program after step 3 until you are sure it is working properly.

Once you have saved a copy as in steps 6 and 7 you can test it out by RUN. Going to the STOP menu you should see a word count of zero. Load a file or type something in and take note of the wordcount value. If you have a fairly long text file, try out the paragraph count facility. You will need to note the start line and the end line of the paragraph you want to count then go to the STOP menu and select "w". Remember the routine will count separate punctuation marks like "-" as complete words. The same will apply to numbers.

The Heading menu item allows you to print the heading already held at 52660 — or if there is no heading in then you can type your own in and 'fix' it to be recalled at any time. However, once you have fixed it you must then re-SAVE the program so that it will be available, each time you re-LOAD. You can do this saving by using item 't' on the menu.



```
  25 GO SUB VAL "4000": PRINT AT
 VAL "2",VAL "0";"print text fil
e                  p"
  55 PRINT : PRINT "heading (for
 letter)              h"
  60 PRINT : PRINT "word count t
otal = ";USR VAL "52610";TAB VAL
 "31";"w"
 170 IF b=VAL "104" THEN  LET i=
VAL "18"
 175 IF b=VAL "119" THEN  LET i=
VAL "20"
 180 IF i<>VAL "0" THEN  PRINT A
T i-VAL "2",VAL "31"; FLASH VAL
"1";CHR$ b;: GO TO VAL "500"
 500 PRINT AT VAL "20",VAL "10";
"                ": PRINT AT VAL "18
",VAL "30";" ": PRINT #VAL "1";"
 press the "; FLASH VAL "1";"ENT
ER"; FLASH VAL "0";" key to proc
eed"'" press "; FLASH VAL "1";"
c"; FLASH VAL "0";" to change ch
oice  "
 670 IF b=VAL "104" THEN  GO TO
VAL "9000"
 680 IF b=VAL "119" THEN  GO TO
VAL "9300"
 699  REM      delete
 710 SAVE a$CODE VAL "52610",VAL
 "12925": GO SUB VAL "900"
 790 VERIFY a$CODE : PRINT AT VA
L "21",VAL "20";" m/code O.K. ":
 RUN
9000 CLS : PRINT "new heading? y
/n"
9002 IF INKEY$<>"y" AND INKEY$<>
"n" THEN  GO TO VAL "9002"
9010 IF INKEY$="n" THEN  RANDOMI
ZE USR VAL "53134": RANDOMIZE US
R VAL "53110": RUN
9020 PRINT "1 - go back and type
 new heading    SEVEN LINES MAXI
MUM"''"2 - fix heading as typed"
9022 IF INKEY$<>"1" AND INKEY$<>
"2" THEN  GO TO VAL "9022"
9030 IF INKEY$="1" THEN  RUN
9040 RANDOMIZE USR VAL "53122":
RUN
9300 INPUT "Start line: ";x: IF
x>VAL "320" OR x<VAL "1" THEN  G
O TO VAL "9300"
9310 PRINT AT VAL "18",VAL "31";
" ";"para starts at line ";x;"
       "
9320 INPUT "End line: ";y: IF y>
VAL "320" OR y<VAL "1" OR y<x TH
```

```
EN  GO TO VAL "932Ø"
933Ø PRINT "para ends   at line
";y
934Ø LET pk=VAL "52614": LET st=
VAL "31999"+VAL "64"*(x-VAL "1")
: LET ln=VAL "64"*(y-x+VAL "1")
935Ø POKE pk+VAL "3",VAL "256"*(
st/VAL "256"-INT (st/VAL "256"))
9351 POKE pk+VAL "4",INT (st/VAL
 "256")
9352 POKE pk,VAL "256"*(ln/VAL "
256"-INT (ln/VAL "256"))
9353 POKE pk+VAL "1",INT (ln/VAL
 "256")+VAL "1"
936Ø PRINT "para count = ";USR V
AL "5261Ø";TAB VAL "25"; FLASH V
AL "1";"any key": PAUSE VAL "Ø"
937Ø POKE pk,VAL "Ø": POKE pk+VA
L "1",VAL "81": POKE pk+VAL "3",
VAL "255": POKE pk+VAL "4",VAL "
124": RUN
98ØØ RESTORE : READ a$: FOR n=52
61Ø TO 52657: LET a=VAL a$( TO 3
): POKE n,a: LET a$=a$(4 TO ): N
EXT n
981Ø DATA "ØØ1ØØØØØØØØ17ØØØØ81Ø33
255124Ø35Ø27Ø62ØØØ18620Ø12625403
2Ø4Ø245ØØ3Ø35Ø27Ø62ØØØ1862ØØØ62Ø
6316525400003200703512625403204З
Ø32235126254Ø32Ø32231Ø24217"
982Ø DATA "Ø3318Ø2Ø5Ø17ØØØ125ØØ1
192ØØ1237176201033ØØØ125Ø171802Ø
5ØØ1192ØØ12371762Ø1Ø33Ø632Ø3Ø172
552Ø4ØØ1Ø64Ø7823718420 1"
984Ø READ a$: FOR n=5311Ø TO 531
45: LET a=VAL a$( TO 3): POKE n,
a: LET a$=a$(4 TO ): NEXT n: STO
P
999Ø PRINT VAL "65536"-USR VAL "
7962"
```



ZX81 Fast Load

Ian Deaville lives in the fast lane in Rotherham and explains to the other ZX81ers how to join him.

This simple little program increases the Baud rate at which the ZX81 saves and loads to 1500. This means that the already awkward save/load system becomes even more critical, however I have found that provided you keep your cassette in good operating condition, clean and with the heads regularly adjusted, then no real problems should be experienced.

You must make absolutely certain that the characters in Line 10 are exactly the same, and the Line 1 REM must contain 244 characters. It might be wise to save a copy of this program BEFORE running it!

Having RUN the program, delete one line at a time, lines 10 to 90 and type in — making sure Line 1 REM is still there — program 2. Prepare a cassette and RUN the program, it will save itself on tape and then set itself up ready for use. Before saving or loading any program load this in first, a program must be saved at this speed before you can reload it at the higher Baud rate.

Use RAND USR 32512 to save a program and RAND USR 32525 to subsequently reload a program.

PROGRAM 1

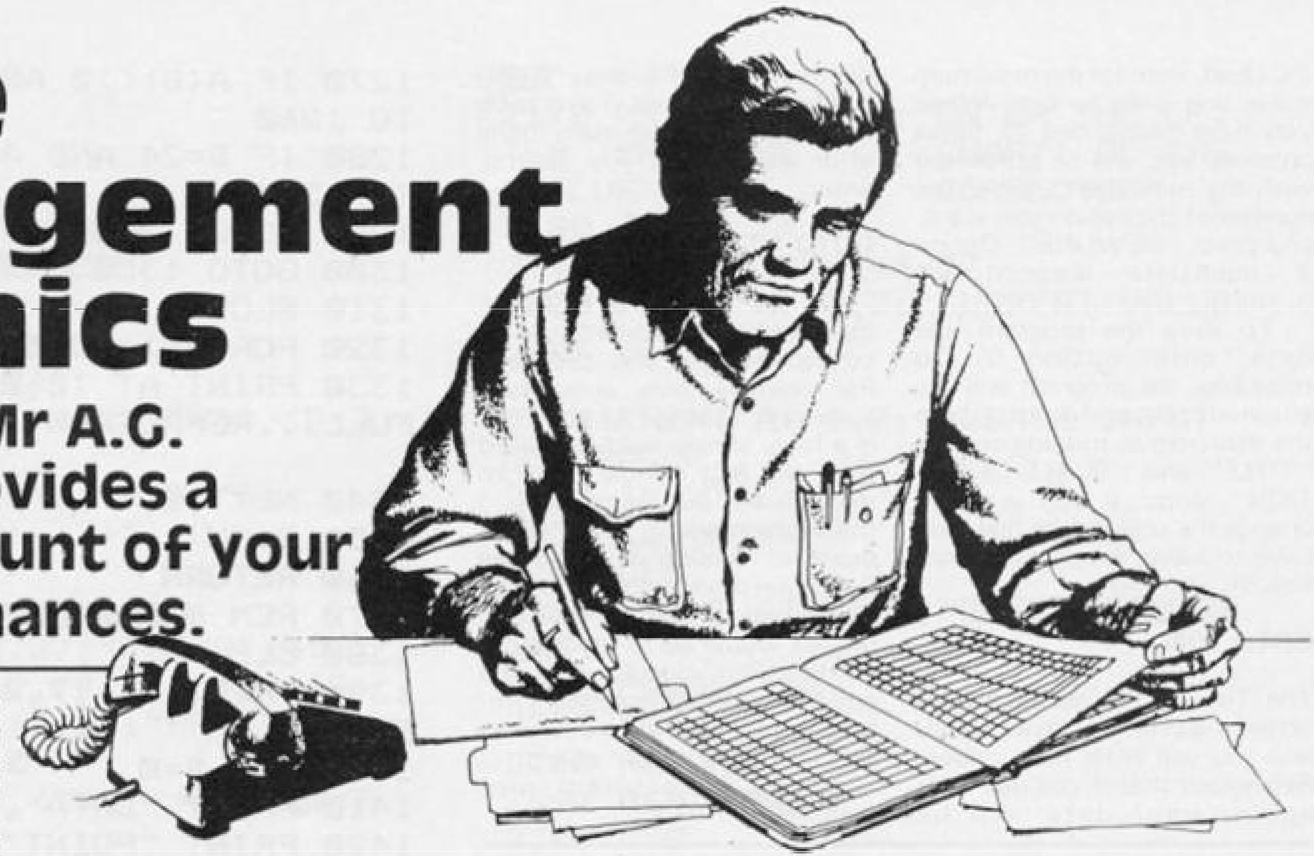
```
1 REM .........244 CHARS........
.......ETC, ETC ........
1Ø LET A$="CD23ØF11Ø67FCD2B7FCD2
BØF211D7F22164ØCD7Ø7FCD2BØFC9ØBØ
BØBØØØØØØØØØØØØØCDA8Ø338F9EB11CB1
2CD46ØF3Ø2E1ØFE1B7AB32ØF4CD4E7FC
B7E2328F821Ø94ØCD4E7FCDFCØ118F85
E37CB13C89FE6Ø2C6Ø14FD3FFØ6231ØF
ECD46ØF3Ø72Ø61E1ØFEØD2ØEEC3D87F1
8EØCDA8Ø3CB12CBØACD7C7F18FBØEØ1Ø
6ØØ3E7FDBFED3FF1F3Ø4917173828 1ØF
1F1BAD2E5Ø3626BCD7C7FCB7A792ØØ3C
B7B7B38F51ØF5D12ØØ4FE563ØB23FCB1
13ØADC97AA728BBCFØCA7Ø65Ø1ØFEC36
E7F21824Ø11ØØ7FØ1EØØØEDBØ21FF7E2
2Ø44ØC3C3Ø3"
15 LET X=16514
2Ø FAST
3Ø IF A$="" THEN GOTO 8Ø
4Ø POKE X,16*CODE A$+CODE A$(2)-
476
5Ø LET A$=A$(3 TO )
6Ø LEY X=X+1
7Ø GOTO 3Ø
8Ø SLOW
9Ø STOP
```

PROGRAM 2

```
1Ø SAVE "SUPERLOAD"
2Ø PRINT "TO SAVE USE RAND USR 3
2512"
3Ø PRINT "TO LOAD USE RAND USR 3
2525"
4Ø PAUSE 15Ø
5Ø RAND USR 16738
```

Home Management Graphics

Glaswegian Mr A.G. Cameron provides a graphic account of your domestic finances.



This program began as a simple routine which I used to plot a bar chart of my electricity bills since I moved into my new house! Gradually it has developed a proper INPUT routine, a SAVE routine, a facility to list the current data, and the ability to generate a vertical scale automatically. With the recent arrival of a new ZX printer, it has also acquired hardcopy facilities.

There is extensive use of subroutines in the program, as I am a confirmed 'structured' programmer, and this is the easiest way to add new code to an old program.

Line 1030 sets up the array to contain your data, and lines 1040 and 1050 prompt for and accept a title for the chart. Line 1060 calls a subroutine to set up the required vertical axis scale, based on the maximum value you wish to plot. These statements are only executed on the initial setting-up run of the program.

Lines 1070 to 1210 display the main menu screen and call the appropriate subroutine depending on the user's selection.

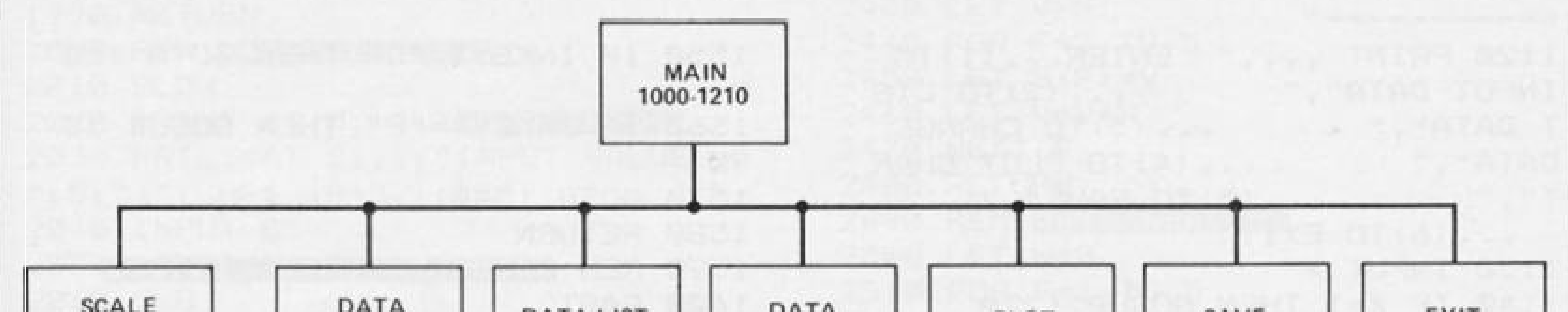
The rest of the program consists of the various subroutines for accepting (1220-1360), correcting (2140-2280) and listing (1370-1750) data, plotting the bar chart (1760-1940), printing the chart (1950-1990), and saving the program with its data (2080-2130).

Scale

The subroutine entitled "SCALE DEFINITION" (2330-2480) looks confusing at first glance. This sets up the vertical axis scale. The user is prompted for the maximum value he wishes to plot to (M). Lines 2380-2400 work out a number which, when multiplied by four, will give a value (N) greater than or equal to M. The labels for the scale are then worked out by accumulating N four times. D is the number which, when divided into the data, will produce a result less than 44, so that it can be plotted on the ZX81's 64 x 44 grid. Lines 2410 to 2470 store the vertical axis labels for later use by the plot routine.

The accompanying hierarchical diagram shows the relationships between all the subroutines called in the program. I find diagrams like these extremely useful as an aid to understanding the logical structure of a program.

After typing in the program and RUNning it for the first time, you will be asked for a title for



HOME MANAGEMENT GRAPHICS

the chart, then for the maximum value you wish to plot. When you have responded to these prompts you will be presented with the main menu. Enter the number of the option you want, and press "NEWLINE". Option 2 — Input Data — is a good place to start!

To save the program and data, enter option 5. On reloading, the program will run automatically, and go straight to the main menu, missing out the "TITLE" and "SCALE DEFINITION" steps. If you want to change the scale or the title, you have to leave the program (option 6), and enter:

GOTO 1040

The Title and Scale Definition screens will be displayed again, and you can enter new values. Remember that if you use RUN again, your data will be destroyed as the array A(24) will be re-initialised. To re-enter the program at the main menu after exiting for any reason, enter:

GOTO 1070

There are still some enhancements which could easily be incorporated into this program. For example, how about fully automatic scaling? All you need is a fairly simple module, called from the Plot routine, to scan through the data array to find the highest value, then call a modified version of the Scale Definition module to set up your axis labels. A more interesting project would be to replace the existing Plot module with one which uses block graphics symbols to plot two values side by side (a 'clustered bar' chart).

Happy (structured) programming.

```
1000 REM HOME MANAGEMENT
         GRAPHICS
1010 REM **VERSION 1.2**
1020 REM ** 20-APR-84 **
1030 DIM A(24)
1040 PRINT "PLEASE INPUT TITLE..
."
1050 INPUT T$
1060 GOSUB 2330
1070 REM MAIN MENU AND CONTROL
1080 SLOW
1090 CLS
1100 PRINT AT 0,(INT ((32-LEN T$
)/2));T$
1110 PRINT "--------------------
-----------"
1120 PRINT ,,,,"  ENTER...(1)TO
INPUT DATA","      ...(2)TO LIS
T DATA","      ...(3)TO CHANGE
DATA","      ...(4)TO PLOT CHAR
T","      ...(5)TO SAVE","
  ...(6)TO EXIT"
1130 INPUT X
1140 IF X=1 THEN GOSUB 1220
1150 IF X=2 THEN GOSUB 1370
1160 IF X=3 THEN GOSUB 2140
1170 IF X=4 THEN GOSUB 1760
1180 IF X=5 THEN GOTO 2080
1190 IF X=6 THEN GOTO 2290
1200 FAST
1210 GOTO 1070
1220 REM DATA CAPTURE
1230 CLS
1240 FAST
1250 LET B=0
1260 LET B=B+1
1270 IF A(B)<>0 AND B<24 THEN GO
TO 1260
1280 IF B=24 AND A(B)<>0 THEN GO
TO 1310
1290 GOSUB 2000
1300 GOTO 1350
1310 SLOW
1320 FOR B=1 TO 50
1330 PRINT AT 10,0;"DATA BUFFER
FULL...REPROGRAM";AT 10,0;"
                               "
1340 NEXT B
1350 SLOW
1360 RETURN
1370 REM LIST DATA
1380 CLS
1390 PRINT AT 17,0;"      CURRENT
DATA",
1400 LET B=0
1410 PRINT "DATA","DATA"
1420 PRINT "POINT","VALUE"
1430 PRINT
1440 LET B=B+1
1450 IF A(B)<>0 THEN PRINT B;" -
 ";CHR$ (B+37),A(B)
1460 SCROLL
1470 IF A(B)=0 THEN LET B=24
1480 IF B<24 THEN GOTO 1440
1490 SCROLL
1500 SCROLL
1510 PRINT "PRESS C TO CONTINUE"
1520 SCROLL
1530 PRINT "      P FOR HARDCOPY
"
1540 IF INKEY$="" THEN GOTO 1540
1550 IF INKEY$="C" THEN GOTO 158
0
1560 IF INKEY$="P" THEN GOSUB 15
90
1570 GOTO 1540
1580 RETURN
1590 REM HARDCOPY DATA LISTING
1600 FAST
1610 FOR F=1 TO 5
1620 LPRINT
1630 NEXT F
1640 LPRINT AT 17,0;"      CURRENT
 DATA",
1650 LET B=0
1660 LPRINT "DATA","DATA"
1670 LPRINT "POINT","VALUE"
1680 LET B=B+1
1690 IF A(B)<>0 THEN LPRINT B;"
- ";CHR$ (B+37);AT 0,16;A(B)
1700 IF B<24 THEN GOTO 1680
```

```
1710 FOR F=1 TO 5
1720 LPRINT
1730 NEXT F
1740 SLOW
1750 RETURN
1760 REM PLOT ROUTINE
1770 CLS
1780 GOSUB 2490
1790 FOR B=1 TO 24
1800 PRINT AT 21,(B+2);CHR$ (B+3
7)
1810 FOR C=2 TO INT (A(B)/D)
1820 PLOT (((B*2)-1)+5),C
1830 NEXT C
1840 NEXT B
1850 PRINT AT 10,27;"PRESS";AT 1
1,27;"C TO";AT 12,27;"CONT;";AT
13,27;"P TO";AT 14,27;"PRINT"
1860 POKE 16418,0
1870 PRINT AT 23,(INT ((32-LEN T
$)/2));T$
1880 POKE 16418,2
1890 IF INKEY$="" THEN GOTO 1890

1900 IF INKEY$="P" THEN GOSUB 19
50
1910 IF INKEY$="C" THEN GOTO 193
0
1920 GOTO 1890
1930 CLS
1940 RETURN
1950 REM PRINT GRAPH
1960 COPY
1970 LPRINT
1980 LPRINT AT 0,(INT ((32-LEN T
$)/2));T$
1990 RETURN
2000 REM INPUT ROUTINE
2010 SLOW
2020 PRINT AT 0,11;"DATA INPUT"
2030 PRINT AT 21,1;"INPUT VALUE
";B;"(";CHR$ (B+37);")"
2040 INPUT E
2050 LET A(B)=E
2060 CLS
2070 RETURN
2080 REM SAVE ROUTINE
2090 CLS
2100 PRINT "START TAPE",,"THEN P
RESS NEWLINE"
2110 IF INKEY$="" THEN GOTO 2110

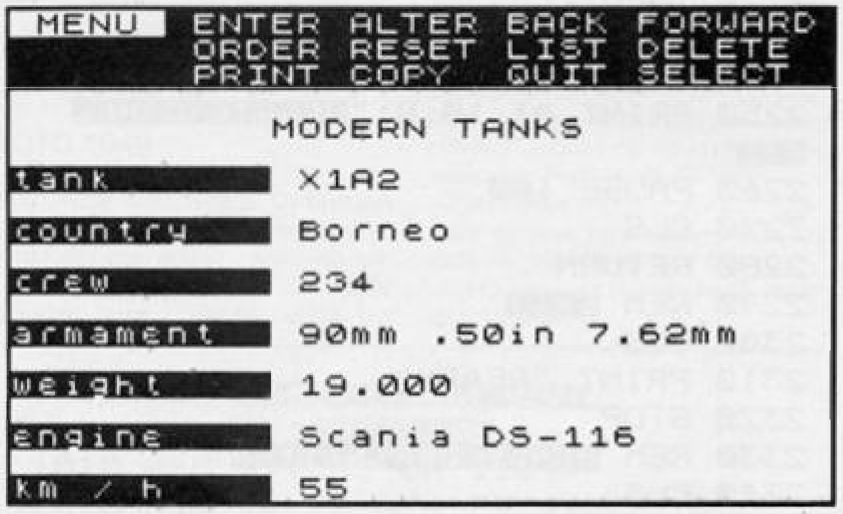
2120 SAVE "BARCHART"
2130 GOTO 1070
2140 REM DATA CORRECTION
2150 CLS
2160 PRINT AT 0,8;"DATA CORRECTI
ON"
2170 PRINT AT 2,2;"ENTER THE LET
TER (FROM THE       CHART) OF THE
 VALUE TO BE       CORRECTED"
2180 INPUT X$
2190 LET Y=CODE X$-37
2200 PRINT AT 2,2;"CURRENT VALUE
 IS: ";A(Y);"
                              "
2210 PRINT AT 4,0;"PLEASE INPUT
NEW VALUE..."
2220 INPUT E
2230 LET A(Y)=E
2240 CLS
2250 PRINT AT 10,8;"UPDATE COMPL
ETE"
2260 PAUSE 100
2270 CLS
2280 RETURN
2290 REM EXIT
2300 CLS
2310 PRINT "READY"
2320 STOP
2330 REM SCALE DEFINITION
2340 CLS
2350 PRINT AT 0,11;"BAR CHART";A
T 1,8;"SCALE DEFINITION";AT 3,1;
"PLEASE ENTER THE MAXIMUM VALUE
 YOU WISH TO CHART..."
2360 INPUT M
2370 DIM B(5)
2380 LET D=INT (M/44+.99999)
2390 LET T=D*44
2400 LET N=T/4
2410 REM SET UP Y-AXIS ARRAY
2420 LET B(1)=0
2430 LET V=N
2440 FOR F=2 TO 5
2450 LET B(F)=V
2460 LET V=V+N
2470 NEXT F
2480 RETURN
2490 REM AUTO SCALING
2500 LET W=0
2510 FOR F=1 TO 5
2520 PRINT AT (20-W),0;STR$ B(F)

2530 LET W=W+5
2540 NEXT F
2550 RETURN
```



Multi-File

R.L. Van Der Wardt sent us this versatile filing program from Holland — just for the record!





This is a superb, user-friendly, program with a wide range of possible uses. One key commands are utilised to the full and as it is written in Basic it can be modified to individual user's requirements.

When you have typed in the program or loaded it from tape you have the option to load a file or define a record's layout. Obviously if this is the first time you have used the program you will need to define the layout.

The first entry is the file name and then you have to enter the number of fields you require (to a maximum of eight). Once this has been entered then enter one by one each of the field titles. When this is complete you should be passed to the main screen which gives the following options:

E — Enter a record
A — Alter a record, pressing ENTER skips over a field.
D — Delete a record
S — Selects a required record
L — lists the whole file, pressing a key halts the listing.
B — Goes back one record
F — Goes forward one record
R — Reset, goes back to the first record
O — Orders (sorts) the file alphabetically
P — Print, as written to a Spectrum printer — Sinclair, Alphacom or GP50s, but can be altered by changing the program.
Q — Quit. Goes back to the main menu.

```
   10 REM

   ************************
   *       MULTI-FILE     *
   *       written by     *
   *     R.L. v.d. Wardt  *
   ************************

   20 PAPER 0: INK 9: BORDER 0: F
LASH 0: BRIGHT 0: OVER 0: INVERS
E 0: CLS : POKE 23562,1: POKE 23
658,0: FOR n=USR "a" TO USR "b"-
1: POKE n,126: NEXT n: REM ▮=A
   30 GO TO 220
   40 REM
           data-print-sys

   50 READ a: FOR d=1 TO a: READ
a$: LET x=VAL a$(1 TO 2): LET in
k=VAL a$(3): LET pap=VAL a$(4):
LET br=VAL a$(5): FOR f=0 TO LEN
 a$-6: PRINT AT x,f; BRIGHT 1;"▮
": PRINT AT x,f; PAPER pap; INK
ink; BRIGHT br;a$(f+6): NEXT f:
NEXT d: RETURN
   60 REM
           inkey$-input-sys

   70 LET yy=y: DIM z$(1,max)
   80 PRINT AT x,y; BRIGHT 1; OVE
R 1;"▮"
   90 PAUSE 15: LET x$=INKEY$
  100 IF CODE x$=6 THEN  RANDOMIZ
E USR 4317: GO TO 80
  110 IF CODE x$<12 OR CODE x$>13
 AND CODE x$<32 OR CODE x$>127 T
HEN  GO TO 80
  120 FOR n=1 TO 5: NEXT n
  130 IF CODE x$=12 THEN  GO TO 1
```

```
7Ø
 14Ø IF CODE x$=13 THEN  GO TO 2
ØØ
 15Ø LET z$(1,y-yy+1)=x$: PRINT
AT x,yy; BRIGHT 1;z$(1): LET y=y
+1: IF y=max+yy THEN  LET y=y-1
 16Ø GO TO 8Ø
 17Ø REM
        delete

 18Ø IF y=yy THEN  PRINT AT x,y;
" ": GO TO 8Ø
 19Ø PRINT AT x,y;" ": LET z$(1,
y-yy)="": LET z$(1,max)="": LET
y=y-1: PRINT AT x,y;" ": GO TO 8
Ø
 2ØØ REM
        enter

 21Ø PRINT AT x,yy; BRIGHT 1;z$(
1): RETURN
 22Ø REM
        start of program

 23Ø RESTORE 23Ø: CLS : DATA 2,"
ØØ621           MULTI-FILE
     ","Ø27Ø1     Written by R.L.
v.d. Wardt": GO SUB 5Ø
 24Ø RESTORE 24Ø: DATA 2,"11Ø6ØP
ress 1 to load a file from tape"
,"13Ø5Ø    Press 2 to define lay
out    ": GO SUB 5Ø
 25Ø IF INKEY$="1" THEN  GO TO 2
8Ø
 26Ø IF INKEY$="2" THEN  GO TO 3
4Ø
 27Ø GO TO 25Ø
 28Ø REM
        load a file from tape

 29Ø DIM r$(11,32): DIM t$(5Ø1,2
1)
 3ØØ RESTORE 3ØØ: CLS : DATA 2,"
ØØ621      LOAD A FILE FROM TAPE
     ","Ø57ØØENTER LOAD-NAME:":
GO SUB 5Ø
 31Ø LET max=6: LET y=16: LET x=
5: GO SUB 6Ø: LET s$=z$(1, TO 6)
 32Ø RESTORE 32Ø: DATA 2,"Ø5Ø6Ø
 INSERT TAPE AND PRESS ~PLAY~  "
,"1Ø7ØØ      Loading ~"+s$+"~ for
 MF": GO SUB 5Ø: PAUSE 5Ø: PRINT
 AT 15,Ø;: LET l$="MFL "+s$: LOA
D l$ DATA r$(): PAUSE 5Ø: PRINT
AT 15,Ø;: LET l$="MFR "+s$: LOAD
 l$ DATA t$()
 33Ø LET t=VAL t$(5Ø1): GO TO 62
Ø
 34Ø REM
        define layout

 35Ø DIM r$(11,32): DIM t$(5Ø1,2
1): LET t$(5Ø1)=STR$ 1: LET t=1
 36Ø RESTORE 36Ø: CLS : DATA 2,"
ØØ621             LAYOUT
     ","2Ø7ØØName of file (max.
32 chars)": GO SUB 5Ø
 37Ø LET max=32: LET x=21: LET y
=Ø: GO SUB 6Ø: LET r$(1)=z$(1, T
O 32): PRINT AT 3,Ø; PAPER 1; IN
K 7;r$(1)
 38Ø PRINT AT 2Ø,Ø,,,,: RESTORE
38Ø: DATA 1,"2Ø7ØØNumber of fiel
ds (max. 8)": GO SUB 5Ø: LET max
=1: LET x=2Ø: LET y=26: GO SUB 6
Ø: IF CODE z$(1)<49 OR CODE z$(1
))56 THEN  GO TO 38Ø
 39Ø LET r$(2)=z$(1)
 4ØØ FOR s=1 TO VAL r$(2)
 41Ø PRINT AT 2Ø,Ø,,,: RESTORE 4
1Ø: DATA 1,"2Ø7ØØName of field "
+STR$ s: GO SUB 5Ø
 42Ø LET max=1Ø: LET y=Ø: LET x=
21: GO SUB 6Ø: LET r$(s+2)=z$(1)
 43Ø PRINT AT s+4,Ø;r$(s+2): NEX
T s
 44Ø PRINT AT 2Ø,Ø,,,,: FOR n=Ø
TO 3ØØ: NEXT n: GO TO 62Ø
 45Ø REM
        menu

 46Ø RESTORE 46Ø: CLS : DATA 3,"
ØØ621           MULTI-FILE
     ","Ø27Ø1     Written by R.L.
v.d. Wardt","Ø37Ø1     1985 Kan
garoo Software": GO SUB 5Ø
 47Ø RESTORE 47Ø: DATA 5,"Ø97ØØ
   [1] ENTER THE FILE","117ØØ
   [2] RESTART MULTI-FILE","137Ø
Ø     [3] SAVE THE FILE","157ØØ
   [4] LOAD A FILE","21Ø6Ø     P
RESS THE APPROPRIATE KEY   ": GO
 SUB 5Ø
 48Ø LET a$=INKEY$
 49Ø IF a$<"1" OR a$>"4" THEN  G
O TO 48Ø
 5ØØ PRINT AT VAL a$*2+7,5; OVER
 1; BRIGHT 1;"■■■": FOR n=Ø TO 2
ØØ: NEXT n
 51Ø IF a$="1" THEN  GO TO 62Ø
 52Ø IF a$="2" THEN  GO TO 22Ø
 53Ø IF a$="3" THEN  GO TO 55Ø
 54Ø IF a$="4" THEN  GO TO 28Ø
 55Ø REM
```

```
        save the file

 560 LET t$(501)=STR$ t
 570 CLS : RESTORE 570: DATA 2,"
00621            SAVE THE FILE
    ","05700ENTER FILENAME": GO
 SUB 50
 580 LET max=6: LET y=15: LET x=
5: GO SUB 60: LET s$=z$(1, TO 6)
 590 RESTORE 590: DATA 2,"05060
  INSERT TAPE AND PRESS ~REC~  "
,"10700          Saving ~"+s$+"~"
: GO SUB 50
 600 LET l$="MFL "+s$: SAVE l$ D
ATA r$(): LET l$="MFR "+s$: PAUS
E 50: POKE 23736,181: SAVE l$ DA
TA t$()
 610 PAUSE 50: BEEP .075,20: PAU
SE 50: GO TO 450
 620 REM
        operating file

 630 LET p=1: LET mem=INT (500/V
AL r$(2))
 640 CLS : PRINT AT 0,0; PAPER 7
; INK 1;" MENU "; INVERSE 1;" EN
TER ALTER BACK FORWARD        OR
DER RESET LIST DELETE         PR
INT COPY  QUIT SELECT  "
 650 PRINT AT 4,0; PAPER 2; INK
6; BRIGHT 1;r$(1): FOR n=3 TO VA
L r$(2)+2: PRINT AT n*2,0; INVER
SE 1;r$(n, TO 10): NEXT n
 660 GO SUB 1530
 670 POKE 23658,0: LET a$=INKEY$
: IF a$="" THEN  GO TO 670
 680 IF a$="s" THEN  GO TO 810
 690 IF a$="r" THEN  GO TO 880
 700 IF a$="c" THEN  GO TO 900
 710 IF a$="p" THEN  GO TO 950
 720 IF a$="d" THEN  GO TO 1040
 730 IF a$="e" THEN  GO TO 1150
 740 IF a$="a" THEN  GO TO 1210
 750 IF a$="o" THEN  GO TO 1300
 760 IF a$="l" THEN  GO TO 1410
 770 IF a$="f" THEN  GO TO 1470
 780 IF a$="b" THEN  GO TO 1500
 790 IF a$="q" THEN  GO TO 450
 800 GO TO 670
 810 REM
        select

 820 PRINT AT 21,0; PAPER 1;"~SE
LECT~"
 830 RESTORE 830: DATA 1,"03701E
NTER ORDER": GO SUB 50: LET x=3:
 LET y=12: LET max=20: GO SUB 60
: LET s$=z$(1, TO y-yy)
 840 FOR n=1 TO t STEP VAL r$(2)
 850 IF t$(n, TO LEN s$)=s$ THEN
 BEEP .05,20: LET p=n: PRINT AT
21,0,,;AT 3,0,,: GO SUB 1530: G
O TO 660
 860 NEXT n: BEEP .05,0: PRINT A
T 21,0,,;AT 3,0,,: FOR n=0 TO 25
: NEXT n
 870 GO TO 660
 880 REM
        reset "p"

 890 LET p=1: GO TO 660
 900 REM
        copy this record

 910 PRINT AT 21,0; PAPER 1;"~CO
PY~ - PLEASE WAIT"
 920 LPRINT r$(1): LPRINT
 930 FOR n=3 TO VAL r$(2)+2: LPR
INT r$(n, TO 10);" ";t$(p+n-3):
NEXT n
 940 LPRINT : LPRINT : PRINT AT
21,0,,: GO TO 660
 950 REM
        copy all records

 960 PRINT AT 21,0; PAPER 1;"~PR
INT~ - PLEASE WAIT"
 970 LPRINT r$(1): LPRINT : LPRI
NT
 980 FOR f=1 TO t-VAL r$(2) STEP
 VAL r$(2)
 990 FOR n=3 TO VAL r$(2)+2: LPR
INT r$(n, TO 10);" ";t$(f+n-3)
1000 IF INKEY$<>"" THEN  PRINT A
T 21,0,,: GO TO 660
1010 NEXT n: LPRINT : LPRINT
1020 NEXT f
1030 LPRINT : LPRINT : PRINT AT
21,0,,: GO TO 660
1040 REM
        delete this record

1050 IF t=1 THEN  GO TO 670
1060 PRINT AT 21,0; PAPER 1;"Del
ete this record? (y/n)"
1070 POKE 23658,0: IF INKEY$="n"
 THEN  PRINT AT 21,0,,: GO TO 66
0
1080 IF INKEY$="y" THEN  GO TO 1
100
1090 GO TO 1070
1100 PRINT AT 21,0,,: PRINT AT 2
1,0; PAPER 1;"Please Wait"
1110 FOR f=p TO p+VAL r$(2)-1: L
```

```
ET t$(f)="": NEXT f
1120 FOR f=p TO t-1: LET t$(f)=t
$(f+VAL r$(2)): NEXT f
1130 LET t=t-VAL r$(2)
1140 PRINT AT 21,Ø,,: LET p=1: G
O TO 66Ø
115Ø REM
         enter

116Ø IF (t-1)/VAL r$(2)>=mem THE
N  GO TO 157Ø
117Ø FOR n=1 TO VAL r$(2): PRINT
 AT n*2+4,11;"
  ": NEXT n
118Ø PAUSE 1Ø: LET x=4: FOR g=1
TO VAL r$(2): LET x=x+2: LET y=1
1: LET max=21: GO SUB 6Ø: LET t$
(t)=z$(1, TO 21): LET t=t+1: NEX
T g
119Ø LET p=t-VAL r$(2): IF p<=Ø
THEN  LET p=1
12ØØ GO TO 66Ø
121Ø REM
         alter

1215 IF t=1 THEN  GO TO 67Ø
122Ø PRINT AT 21,Ø; PAPER 1;"~AL
TER~": PRINT AT 3,Ø; INVERSE 1;
BRIGHT 1;"  Press ~ENTER~ to ski
p a field "
123Ø PAUSE 1Ø: LET tt=t: LET t=p
: LET max=21: LET y=11: LET x=4
124Ø FOR q=1 TO VAL r$(2)
125Ø LET y=11: LET x=x+2: GO SUB
 6Ø
126Ø IF z$(1)="
  " THEN  PRINT AT x,11; BRIGH
T 1;t$(t): GO TO 128Ø
127Ø LET t$(t)=z$(1, TO 21)
128Ø LET t=t+1: NEXT q
129Ø PRINT AT 21,Ø,,;AT 3,Ø,,: L
ET t=tt: GO TO 66Ø
13ØØ REM
         alphabetical order

131Ø PRINT AT 21,Ø; PAPER 1;"~OR
DER~  PLEASE WAIT"
132Ø DIM v$(VAL r$(2),21): DIM w
$(VAL r$(2),21)
133Ø FOR k=1 TO t-VAL r$(2) STEP
 VAL r$(2): FOR j=1 TO t-(VAL r$
(2)+1)-k STEP VAL r$(2)
134Ø FOR f=1 TO VAL r$(2): LET v
$(f)=t$(j+f-1): NEXT f
135Ø FOR f=1 TO VAL r$(2): LET w
$(f)=t$(j+f+(VAL r$(2)-1)): NEXT
 f
136Ø IF v$(1)<=w$(1) THEN  GO TO
 139Ø
137Ø FOR f=1 TO VAL r$(2): LET t
$(j+f-1)=w$(f): NEXT f
138Ø FOR f=1 TO VAL r$(2): LET t
$(j+f+(VAL r$(2)-1))=v$(f): NEXT
 f
139Ø NEXT j: NEXT k
14ØØ PRINT AT 21,Ø,,: LET p=1: B
EEP .Ø5,2Ø: GO TO 66Ø
141Ø REM
         list

142Ø PRINT AT 21,Ø; PAPER 1;"~LI
ST~": FOR p=1 TO t-VAL r$(2) STE
P VAL r$(2)
143Ø GO SUB 153Ø
144Ø FOR n=1 TO 75: IF INKEY$<>"
" THEN  BEEP .5,2Ø: PRINT AT 21,
Ø,,: GO TO 67Ø
145Ø NEXT n
146Ø NEXT p: LET p=p-VAL r$(2):
PRINT AT 21,Ø,,: GO TO 67Ø
147Ø REM
         forward

148Ø LET p=p+VAL r$(2): IF p>=t
THEN  LET p=t-VAL r$(2)
149Ø GO TO 66Ø
15ØØ REM
         back

151Ø LET p=p-VAL r$(2): IF p<=Ø
THEN  LET p=1
152Ø GO TO 66Ø
153Ø REM
         print record

154Ø IF t=Ø THEN  RETURN
155Ø IF p<=Ø THEN  LET p=1
156Ø LET d=1: FOR n=p TO p+VAL r
$(2)-1: PRINT AT d*2+4,11; BRIGH
T 1;t$(n): LET d=d+1: NEXT n: RE
TURN
157Ø REM
         no more memory left

158Ø PRINT AT 21,Ø; PAPER 1;"
   NO MORE MEMORY LEFT!       ":
FOR n=Ø TO 15: BEEP .Ø5,2Ø: BEEP
 .Ø5,25: NEXT n
159Ø FOR n=Ø TO 2ØØ: NEXT n
16ØØ PRINT AT 21,Ø,,
161Ø GO TO 66Ø
9999 CLEAR : SAVE "MULTI-FILE" L
INE Ø: PAUSE 5Ø: VERIFY "MULTI-F
ILE": PAUSE 5Ø: RUN
```

Tabcalc

An excellent spreadsheet program from J.F. Tydeman, specifically for the Wafadrive and Kempston E, but very easily modified to suit all systems.

TABCALC is a spreadsheet program designed to take full advantage of the facilities offered by the Robotronics Wafadrive and a line printer. An alternative listing is provided to permit the program to be used with the Kempston 'E' interface and a little hacking is all that is required to adapt the program to other interfaces and Microdrive. Tape facilities haven't been forgotten either, but the ZX printer just doesn't have enough characters per line to produce a useful printout from this type of program.

Entering the listing

Listing 1 is for the Wafadrive and uses the Wafadrive's Centronics port to feed the printer. Simply enter the listing and run the program. Should you wish to use Microdrive, modify the appropriate LOAD/SAVE commands in the routine starting at line 5000 but note the different way in which the Wafadrive handles the loading and saving of data. Enter listing 2 instead of lines 3000 to 3420 if you wish to use the Kempston 'E' interface. Listing 2 should be easily modified to suit other interfaces. Interface software should be entered instead of line 3020 and lines 3340, 3360, 3390 and 3410, which remove or implement Spectrum command word tokens should be either left out or substituted with those required by your interface. If you wish to use a printer other than the Epson or Star you *will* have to check the printer codes against those given in your printer manual. If you do not have the Wafadrive, you will be unable to enter some of the lines as these use the Wafadrive's Extended Basic. Don't enter these lines which only occur in the Load/Save routine. Modify the Menu accordingly.

Program Description

The program, which stores information entered in a three dimensional array, uses the Spectrum's string handling facilities extensively, particularly when handling the screen display. It is menu driven and features eight principal routines. A description of these is given in figure 1.

Figure 1. Description of main routines.

2000-2060	Defines certain variables representing either a screen location or the corresponding position in the array A$ and then prints the initial screen display.
2070-2220	The Input Logo. This loop enables the cursor to be moved and data to be entered or deleted as required. Subroutines located at lines 2230-2510 are called to print on screen as required. The principle options available are: Caps shift + '5' — Move cursor left Caps shift + '6' — Move cursor down Caps shift + '7' — Move cursor up Caps shift + '8' — Move cursor right Symb.shift + 'A' — Return to menu Symb.shift + ':' — Print ':' at cursor Delete — Delete at cursor, and backspace. Enter — Move cursor to first position of next column. If end of array, print cursor at beginning of next line ASC 2 Character — Print at cursor position 'T' — Entered to indicate the position of a subtotal.
2230-2310	Reprint screen display if cursor moves off right hand edge.
2320-2370	Reprint screen display if cursor moves off left hand edge.
2380-2420	Reprint screen display if cursor moves off top edge.
2430-2470	Reprint screen display if cursor moves off bottom edge.
2480-2490	'Enter' Subroutine.
3000-3170	Print on-screen a menu of various printer codes and format options. A little practice will enable you to select an appropriate format and print it anywhere desired on A4 paper. The BOX option is used to print out numeric data in the form of a table and should be used in conjunction with LINE SPACING for optimum effect. Print options are cancelled when printing is completed and must be re-entered if a copy is required.
3180-3310	Requests the input of a title and sends to the printer the data to be printed.
4010-4070	Checks to see if the appropriate Totals flags have been reset. If not, goes to the appropriate subroutine.
4080-4200	Sets all column totals initially to 0 and enters a series of nested loops to total each column. Safeguards included in lines 4150 and 4160 prevent the program crashing if a nul entry is found, or the total becomes too big.
4210-4350	Similar routine for Line Totals.
4360-4370	Minor subroutine to set keyboard 'click'.

REFORMAT/INITIALISE . . . LINES 9000-9440

When using the program for the first time it must be formatted. To do this select option 1 from the Main Menu.

LINE NUMBERS	DESCRIPTION
9010	Gives the opportunity to return to the menu if the option has been chosen in error.
9020-9170	This section permits you to define up to 15 column titles, each eight spaces wide. Line Titles and Totals columns are not included as they are formatted automatically. The maximum width of the array A$ is 136 characters, which corresponds to the number of characters which can be printed in condensed mode.
9180-9310	Routine for entering Line Titles. Up to 99 titles may be entered. If you wish to enter text commands you may enter a blank title in the appropriate line. This facility is also available when entering column titles. Used together it is possible to format the program to the required dimensions without entering titles and should be used if only text entry, or columns of non-standard width are required. Titles may then be entered from the main program.
9320-9340	Permits column markers to be entered and should only be selected if columns of a standard eight character width are required.
9340-9450	Defines certain variables used by the Printer Routine.

MONTHLY EXPENSES							
MAR 85		HOTEL	MEALS	DRINKS	FARES	SUNDRY	TOTALS
	1				2.65	1.80	4.45
	2						0
SUN	3						0
	4		9.54	3.44			12.98
	5	20.30	6.32			1.00	27.62
	6						0
	7				12.54		12.54
	8						0
	9						0
SUN	10						0
	11						0
	12		4.25		8.62	.90	13.77
	13	21.65					21.65
	14					1.23	1.23
	15						0
	16						0
SUN	17						0
	18						0
	19		4.63	1.91			6.54
	20						0
	21				2.45	.90	3.35
	22						0
	23						0
SUN	24						0
	25						0
	26						0
	27	18.44		2.45	1.65		22.54
	28						0
	29		2.45		.98		3.43
	30						0
SUN	31						0
TOTALS		60.39	27.19	7.8	28.89	5.83	130.1

Enter and/or Amend Data (Lines 2000-2510)

This routine is the heart of the program and is probably the most complex. It works by slicing the three dimension array A$, defined during initialisation, and printing on the screen in two 'Windows'. These windows correspond to the following screen locations. Line 0, Column 8, and Line 20, Column 31. A '*' cursor which may be moved to any position on the screen using the cursor keys, or to the next column by depressing ENTER should be positioned where it is required to enter or amend data. If the cursor moves off the screen in any direction the appropriate window is reprinted. A slight pause is experienced at this point. The Enter/Amend option MUST NOT be selected unless the program has either been Formatted, or a Data File loaded otherwise an Error will result.

Sub-totals at any line may be selected by entering a 'T' in the first space of the column where it is required. These markers should be entered each time a calculation, or recalculation is made as the calculation routine removes them.

Printer Routine (Lines 3000-3420)

The listing of this routine in the main program uses the wafadrive's centronics port. If, however, you do not have a wafadrive, listing 2 will give you the same printer facilities via the Kempston 'E' interface. Both listings are for Epson or Star printers but should be easy to modify for other printers. The routine provides an extensive range of formats and up to 136 characters per line may be printed in condensed mode. If you have selected a format containing more than 6 x 8 character columns, (excluding Titles and Totals), you will need to select the condensed printing mode.

Calculation Routine (Lines 4000-4370)

This routine should only be used if standard eight-character columns have been formatted. If either, or both, Column and Line totals have been cancelled (Option 8) then flags will have been set to prevent the appropriate part of the routine from functioning. A safeguard is included which will prevent Totals containing more digits than the column width from being printed. An audible warning is given during calculation should this occur. As the routine can take some time if the array has been extensively filled with data, the column or line number currently being totalled is displayed on screen.

SAVE/LOAD routine (Lines 5000-5300)

A comprehensive routine to load/save to tape or wafer which could easily be adapted for use in other programs. If you are converting this routine to microdrive it should be noted that Saving or Loading Data on the Wafadrive is carried out by reading the different elements of the array A$. This is achieved with nested loops which are necessary with tape or microdrive. Note that Column Titles and all the variables necessary to run an unformatted version of the program are also saved.

Attributes (Lines 8000-8020)

A simple routine which enables Paper and Ink colours to be set from the Menu.

Clear numeric data (Lines 6140-6200)

Nested loops are used to clear the array with the exception of line and column titles. The routine then calls part of the format routine to allow the option of entering column markers.

Cancel/reinstate totals (Lines 6000-6130)

This routine prints a menu which gives options to cancel or reinstate Line and Column Totals. Flags are set and the array sliced according to the option selected. Data recorded in these segments is retained in memory. Exercising this option fully, after formatting without Line/Column Titles or Column Markers, enables text only to be entered. If you wish to enter a mixture of text and numeric data then enter numeric data first, calculate totals (if required), cancel Line and column totals and then enter text. If applicable, Column and Line Totals should be reinstated before sending data to the printer.

Important points

1. The largest number which can be entered is 9999999 or in decimal form 9999.99. Totals or sub-totals which exceed this will not be entered.
2. Text comments must not be entered before totals have been calculated.
3. The program must be INITIALISED or DATA LOADED before selecting any of the other MENU options.
4. Should the program return to BASIC for any reason it may be restarted with GOTO 1. Do not use RUN as this will clear all data entered.

Program 1.

```
 5ØØ REM  TABCALC
 51Ø BRIGHT 1: INK 5: BORDER Ø:
PAPER Ø: CLS
1ØØØ BEEP .5,2: POKE 23658,8: CL
S : PRINT AT Ø,1Ø; INVERSE 1;"OP
TIONS"''
1Ø1Ø PRINT "(1) RE-FORMAT/INITIA
LISE";''
1Ø2Ø PRINT "(2) ENTER AND/OR AME
```

```
ND DATA";''
1030 PRINT "(3) PRINTER ROUTINE"
;''
1040 PRINT "(4) CALCULATION ROUT
INE";''
1050 PRINT "(5) SAVE/LOAD ROUTIN
E";''
1060 PRINT "(6) ATTRIBUTES";''
1070 PRINT "(7) CLEAR NUMERIC DA
TA";''
1080 PRINT "(8) CANCEL/REINSTATE
 TOTALS";''
1085 PRINT "(9) WAFER DIRECTORY"
;''
1090 PRINT #0;AT 0,0; INVERSE 1;
"SELECT ROUTINE NUMBER REQUIRED"
: PAUSE 0
1100 IF INKEY$="1" THEN  GO SUB
9000
1110 IF INKEY$="2" THEN  GO SUB
2000
1120 IF INKEY$="3" THEN  GO SUB
3000
1130 IF INKEY$="4" THEN  GO SUB
4000
1140 IF INKEY$="5" THEN  GO SUB
5000
1150 IF INKEY$="6" THEN  GO SUB
8000
1160 IF INKEY$="7" THEN  GO SUB
6140
1170 IF INKEY$="8" THEN  GO SUB
6000
1180 IF INKEY$="9" THEN  CLS : I
NPUT "DRIVE A OR B?";D$: GO SUB
6500
1190 GO TO 1000
2000 REM  MAIN LOOP
2010 LET P=1: LET X=1: LET Y=8:
LET L=1: LET C=9
2020 CLS
2030 IF WIDTH>32 THEN  PRINT  IN
VERSE 1;A$(VAST,1, TO 32): FOR N
=1 TO LINES: PRINT ; INVERSE 1;A
$(P,N,1 TO 8); INVERSE 0;A$(P,N,
9 TO 32): IF N=W THEN  GO TO 206
0
2040 IF WIDTH<=32 THEN  PRINT  I
NVERSE 1;A$(VAST,1, TO WIDTH): F
OR N=1 TO LINES: PRINT ; INVERSE
 1;A$(P,N,1 TO 8); INVERSE 0;A$(
P,N,9 TO WIDTH): IF N=W THEN  GO
 TO 2060
2050 NEXT N
2060 PRINT ; INVERSE 1;AT 21,0;"

"
2070 PRINT ; OVER 1; PAPER 8;AT
X,Y;"*": PAUSE 2
2080 PRINT ; OVER 1; PAPER 8;AT
X,Y;"*"
2090 LET B$=INKEY$
2100  IF L>=1 AND CODE B$>=32 AN
D CODE B$<=127 THEN  PRINT ;AT X
,Y;B$: LET A$(P,L,C)=B$: LET Y=Y
+1: LET C=C+1: GO SUB 4360: IF Y
>31 OR C>WIDTH THEN  GO SUB 2230
2110 IF L<1 AND CODE B$>=32 AND
CODE B$<=127 THEN  PRINT ;AT X,Y
;B$: LET A$(VAST,1,C)=B$: GO SUB
 4360: LET Y=Y+1: LET C=C+1: IF
Y>31 OR C>WIDTH THEN  GO SUB 223
0
2120 IF B$=CHR$ 9 THEN  LET Y=Y+
1: LET C=C+1: GO SUB 4360: IF Y>
31 OR C>WIDTH THEN  GO SUB 2230
2130 IF B$=CHR$ 8 THEN  LET Y=Y-
1: LET C=C-1: GO SUB 4360: GO SU
B 7000
2140 IF B$=CHR$ 10 THEN  LET X=X
+1: LET L=L+1: GO SUB 4360: IF X
>20 OR L>LINES OR (20*(P-1))+(L-
1)=W THEN  LET P=P+1: GO SUB 243
0
2150 IF B$=CHR$ 11 THEN  GO SUB
7040: GO SUB 4360: LET X=X-1: LE
T L=L-1: IF L<0 THEN  LET L=0: L
ET X=0: BEEP .1,.1
2160 IF CODE B$=195 THEN  LET B$
=CHR$ 124: PRINT ;AT X,Y;B$: LET
 A$(P,L,C)=B$: LET Y=Y+1: LET C=
C+1: GO SUB 4360: IF Y>31 OR C>W
IDTH THEN  GO SUB 2230
2170 IF CODE B$=12 AND X=0 THEN
 GO SUB 7000: PRINT ;AT X,Y;" ":
 LET A$(VAST,1,C)="": LET Y=Y-1:
 LET C=C-1: GO SUB 4360
2180 IF CODE B$=12 AND X>0 THEN
 GO SUB 7000: GO SUB 4360: PRINT
 ; INVERSE 1;AT X,Y;" ": LET A$(
P,L,C)="": LET Y=Y-1: LET C=C-1
2190 IF CODE B$=13 THEN  LET C=C
-Y: LET Y=INT (Y/8): LET Y=Y*8+8
: LET C=C+Y: GO SUB 4360: GO SUB
 2480
2200 IF B$=CHR$ 226 THEN  BEEP .
5,.5: RETURN
2210 PRINT AT 21,0; INVERSE 1;"P
AGE ";P;" ";AT 21,11;"LINE ";L;"
 ";AT 21,21;"COLUMN ";C;" "
2220 GO TO 2070
2230 IF C>WIDTH THEN  LET C=C-1:
 LET Y=Y-1: BEEP .5,.5: RETURN
2240 IF L>LINES THEN  LET L=L-1:
 LET X=X-1: BEEP .2,.2: RETURN
2250 LET Y=8
```

```
2260 IF C+23>WIDTH THEN  PRINT A
T Ø,8;U$(9 TO 32): PRINT AT Ø,8;
 INVERSE 1;A$(VAST,1,C TO WIDTH)
: GO TO 2280
2270 IF C-23<=WIDTH THEN  PRINT
AT Ø,8; INVERSE 1;A$(VAST,1,C TO
 C+23)
2280 IF C+23<WIDTH THEN  FOR N=1
 TO 20: IF N+20*(P-1)<=W THEN  P
RINT ; INVERSE 1;AT N,Ø;A$(P,L-X
+N,1 TO 8); INVERSE Ø;AT N,8;A$(
P,L-X+N,C TO C+23): NEXT N
2270 IF C+23>=WIDTH THEN  FOR N=
1 TO LINES: IF N+20*(P-1)<=W THE
N  PRINT ; INVERSE 1;AT N,Ø;A$(P
,L-X+N,1 TO 8); INVERSE Ø;AT N,8
;U$(9 TO );AT N,8;A$(P,L-X+N,C T
O WIDTH): NEXT N
2300 IF N<21 THEN  FOR M=N TO 20
: PRINT AT N,Ø;U$(1 TO 32): NEXT
 N
2310 RETURN
2320 REM  LEFT
2330 IF C<9 THEN  LET C=C+1: LET
 Y=Y+1: BEEP .5,.5: RETURN
2340 LET Y=31
2350 PRINT AT Ø,8; INVERSE 1;A$(
VAST,1,C-23 TO C)
2360 FOR N=1 TO LINES: IF N+20*(
P-1)<=W THEN  PRINT AT N,8;A$(P,
L-X+N,C-23 TO C): NEXT N
2370 RETURN
2380 REM  UP
2390 IF P<1 THEN  LET P=P+1: LET
 L=L+1: LET X=X+1: BEEP .1,.1: R
ETURN
2400 LET YY=Y: LET CC=C: LET C=C
-Y+8: LET L=20: LET X=20: LET Y=
8: GO SUB 2280
2410 LET Y=YY: LET C=CC
2420 RETURN
2430 REM DOWN
2440 IF P>PAGES OR W<100 AND ((2
Ø*P)+L-1)=W THEN  LET P=P-1: LET
 X=X-1: LET L=L-1: BEEP .2,.2: R
ETURN
2450 LET YY=Y: LET CC=C: LET C=C
-Y+8: LET Y=8: LET L=1: LET X=1:
 GO SUB 2280
2460 LET Y=YY: LET C=CC
2470 RETURN
2480 REM  ENTER
2490 IF C>=WIDTH THEN  LET X=X+1
: LET L=L+1: LET Y=8: LET C=9: G
O SUB 2260: IF X>20 OR (20*(P-1)
)+L-1)=W THEN  LET P=P+1: GO SUB
 2430: RETURN
2500 IF Y>31 THEN  GO SUB 2230
2510 RETURN
3000 REM PRINTER CODES
3010 CLS :
3020 OPEN #*4,"c"
3030 POKE 23679,WIDTH
3040 PRINT ; INVERSE 1;AT Ø,19;"
PRINTER CODES"
3050 PRINT ;AT Ø,Ø;"(1)  COMPRES
SED";'';"(2)  ENLARGED";'';"(3)
 SUBSCRIPT";'';"(4)  IMPRESSED";
'';"(5)  ITALICS";'';"(6)  BOXED
";'';"(7)  SET LEFT MARGIN ";'';
"(8)  DOUBLE STRIKE";'';"(9)  LI
NE SPACING";'';"(P)  LLPRINT DAT
A";'';"(M)  MAIN MENU"
3060 PRINT ;AT 2,19; INVERSE 1;"
ENTER  NUMBER";AT 3,19;"  REQUIR
ED.  ": PAUSE Ø: IF INKEY$="P" T
HEN  GO TO 3180
3070 IF INKEY$="1" THEN  PRINT #
4;CHR$ 15
3080 IF INKEY$="2" THEN  PRINT #
4;CHR$ 27+CHR$ 87
3090 IF INKEY$="3" THEN  PRINT #
4;CHR$ 27+CHR$ 83
3100 IF INKEY$="4" THEN  PRINT #
4;CHR$ 27+CHR$ 69
3110 IF INKEY$="5" THEN  PRINT #
4;CHR$ 27+CHR$ 52
3120 IF INKEY$="6" THEN  LET R=1
3130 IF INKEY$="7" THEN  GO SUB
3320
3140 IF INKEY$="8" THEN  PRINT #
4;CHR$ 27+CHR$ 71
3150 IF INKEY$="9" THEN  GO SUB
3380
3160 IF INKEY$="M" THEN  CLOSE #
*4: RETURN
3170 GO TO 3030
3180 CLS : PRINT #Ø;AT Ø,Ø; INVE
RSE 1;"SET PAPER POSITION & PRES
S ENTER": PAUSE Ø
3190 INPUT ; INVERSE 1;"INPUT ""
TITLE"" OR ""ENTER""";Z$
3200 PRINT #4;AT Ø,8;Z$: PRINT #
4;" "
3210 PRINT #4;A$(VAST,1,1 TO WID
TH)
3220 FOR M=1 TO PAGES: FOR N=1 T
O LINES
3230 IF LEN T$>=WIDTH AND M=1 AN
D N=1 AND R=1 THEN  PRINT #4;T$(
1 TO WIDTH)
3235 IF LEN T$<WIDTH AND M=1 AND
 N=1 AND R=1 THEN  PRINT #4;T$
3240 IF R=1 THEN  PRINT #4;S$(1
TO WIDTH)
3250 PRINT #4;A$(M,N,1 TO WIDTH)
```

```
3260 IF R=1 THEN  PRINT #4;R$(1
TO WIDTH)
3270 IF ((M-1)*20)+N=W THEN  GO
TO 3290
3280 NEXT N: NEXT M
3290 LET R=0
3300 PRINT #4;CHR$ 27+CHR$ 64
3310 CLOSE #*4: RETURN
3330 INPUT ; INVERSE 1;"NUMBER O
F CHARACTER SPACES FOR  MARGIN
                    ";Z
3350 PRINT #4;CHR$ 27+CHR$ 77+CH
R$ Z
3370 RETURN
3380 PRINT AT 10,0; INVERSE 1;"N
UMBER PIXELS FOR LINE SPACING  E
NTER: 8 = NORMAL: 6 = SUBSCRIPT4
 = COMPRESSED SUBSCRIPT  "
: INPUT Z
3400 PRINT #4;CHR$ 27+CHR$ 65+CH
R$ Z
3420 CLS : RETURN
4000 REM  TOTALS
4010 CLS : IF COLT=0 AND LINT=0
THEN  PRINT ; FLASH 1;AT 10,0;"T
OTALS CALCULATION NOT AVAILABLE"
: PAUSE 200: RETURN
4020 IF COLT=0 THEN  GO TO 4040
4030 GO SUB 4080
4040 IF LINT=0 THEN  RETURN
4050 BEEP .1,.1
4060 GO SUB 4210
4070 RETURN
4080 REM  COLUMN
4090 FOR N=9 TO (WIDTH-8) STEP 8
: LET A$(PAGES,W-20*(PAGES-1),N
TO N+6)="    0": NEXT N
4100 FOR O=9 TO WIDTH-8 STEP 8:
LET TOT=0: LET SUBTOT=0: LET COU
NT=0
4110 PRINT ; INVERSE 1;AT 10,5;"
CALCULATING COLUMN : ";INT (O/8)
;" "
4120 FOR M=1 TO PAGES
4130 FOR N=1 TO 20
4140 LET COUNT=COUNT+1: IF COUNT
>W-1 THEN  GO TO 4190
4150 IF A$(M,N,O TO O+6)="
 " THEN  GO TO 4170
4155 IF A$(M,N,O)="T" THEN  LET
SUBTOT=TOT-SUBTOT: LET E$=STR$ S
UBTOT: GO SUB 8500: LET A$(M,N,O
 TO O+6)=E$: LET SUBTOT=TOT: GO
TO 4170
4160 LET TOT=VAL A$(PAGES,W-20*(
PAGES-1),O TO O+6)+VAL A$(M,N,O
TO O+6): GO SUB 8030: LET A$(PAG
ES,W-20*(PAGES-1),O TO O+6)=Y$:
IF COR=1 THEN  LET COR=0: LET A$
(PAGES,W-20*(PAGES-1),O TO O+6)=
"TOO BIG": NEXT O
4170 NEXT N
4180 NEXT M
4190 NEXT O
4200 RETURN
4210 REM  LINES
4220 LET COUNT=0
4230 FOR M=1 TO PAGES
4240 FOR N=1 TO 20
4250 IF A$(M,N,1 TO 7)="       "
 THEN  LET A$(M,N,O TO O+6)="
 ": GO TO 4320
4260 PRINT ; INVERSE 1;AT 10,5;"
CALCULATING LINE     : ";N+(20*(M-
1));" "
4270 LET A$(M,N,WIDTH-7 TO WIDTH
-1)="     0"
4280 FOR O=9 TO (WIDTH-15) STEP
8
4290 IF A$(M,N,O TO O+6)="
 " THEN  GO TO 4310
4300 LET TOT=VAL A$(M,N,(WIDTH-7
) TO (WIDTH-1))+VAL A$(M,N,O TO
O+6): GO SUB 8030: LET A$(M,N,WI
DTH-7 TO WIDTH-1)=Y$: IF COR=1 T
HEN  LET COR=0: LET A$(M,N,WIDTH
-7 TO WIDTH-1)="TOO BIG": NEXT O
4310 NEXT O
4320 NEXT N
4330 NEXT M
4340 BEEP .5,.5
4350 RETURN
4360 REM KEYBOARD CLICK
4370 BEEP .007,3: RETURN
5000 CLS : PRINT "SAVE / LOAD OP
TIONS": PRINT AT 2,0;"(1) SAVE P
ROGRAM TO TAPE ";AT 4,0;"(2) SAV
E PROGRAM WAFER DRIVE A";AT 6,0;
"(3) SAVE PROGRAM WAFER DRIVE B"
;AT 8,0;"(4) SAVE DATA TO TAPE"
5010 PRINT AT 10,0;"(5) SAVE DAT
A TO WAFER DRIVE A";AT 12,0;"(6)
 SAVE DATA TO WAFER DRIVE B";AT
14,0;"(7) LOAD DATA FROM TAPE";A
T 16,0;"(8) LOAD DATA FROM WAFER
 DRIVE A";AT 18,0;"(9) LOAD DATA
 FROM WAFER DRIVE B"
5020 PRINT #0;AT 0,0;"SELECT NUM
BER OF OPTION REQUIRED": PAUSE 0
5030 IF INKEY$="2" THEN  CAT *:
INPUT "NAME ? ";Q$: SAVE #Q$ LIN
E 500: VERIFY *Q$: CAT *: PAUSE
150: RETURN
5040 IF INKEY$="3" THEN  POKE 23
767,1: CAT *: INPUT "NAME ? ";Q$
: SAVE #Q$ LINE 500: VERIFY *Q$:
```

```
CAT *: POKE 23767,0: PAUSE 150:
 RETURN
5050 IF INKEY$="4" THEN GO SUB
5200: INPUT "NAME ? ";Q$: SAVE Q
$ DATA A$(): RETURN
5060 IF INKEY$="5" THEN GO SUB
5200: GO TO 5130
5070 IF INKEY$="6" THEN GO SUB
5200: POKE 23767,1: GO SUB 5130:
 POKE 23767,0: RETURN
5080 IF INKEY$="7" THEN CLS : I
NPUT "NAME ?";Q$: PRINT AT 20,10
;"START THE TAPE": LOAD Q$ DATA
A$(): GO SUB 5300: RETURN
5090 IF INKEY$="8" THEN GO SUB
5150: GO SUB 5300: RETURN
5100 IF INKEY$="9" THEN POKE 23
767,1: GO SUB 5150: POKE 23767,0
:: GO SUB 5300: RETURN
5110 IF INKEY$="1" THEN INPUT "
NAME? ";Q$: SAVE Q$ LINE 500: RE
TURN
5120 GO TO 5000
5130 CAT *: INPUT "NAME ? ";Q$:
INPUT "ERASE?";Z$: IF Z$="Y" THE
N ERASE *Q$
5140 OPEN #*4,Q$: FOR M=1 TO 6:
FOR N=1 TO 20: PRINT #4;A$(M,N):
 NEXT N: NEXT M: CLOSE #*4: CLS
: CAT *: PAUSE 150: RETURN
5150 CAT *: INPUT "NAME ? ";Q$
5160 DIM A$(6,20,136): OPEN #*4,
Q$: FOR M=1 TO 6: FOR N=1 TO 20:
 INPUT #4;A$(M,N): NEXT N: NEXT
M: CLOSE #*4: RETURN
5170 RETURN
5200 CLS : PRINT #0;AT 0,0;"SAVI
NG ";Q$: LET A$(6,2)=STR$ WIDTH:
 LET A$(6,3)=STR$ LINES: LET A$(
6,4)=STR$ W: LET A$(6,5)=STR$ VA
ST: LET A$(6,6)=STR$ PAGES: LET
A$(6,7)=STR$ COLT: LET A$(6,8)=S
TR$ LINT: LET A$(6,9)=STR$ COR:
RETURN
5300 LET WIDTH=VAL A$(6,2): LET
LINES=VAL A$(6,3): LET W=VAL A$(
6,4): LET VAST=VAL A$(6,5): LET
PAGES=VAL A$(6,6): LET COLT=VAL
A$(6,7): LET LINT=VAL A$(6,8): L
ET COR=VAL A$(6,9): GO SUB 9350:
 RETURN
6000 REM CANCEL/REINSTATE TOTAL
S
6010 CLS
6020 PRINT AT 1,0;"(1) CANCEL L
INE TOTALS"
6030 PRINT AT 5,0;"(2) RE-INSTA
TE LINE TOTALS"
6040 PRINT AT 10,0;"(3) CANCEL
COLUMN TOTALS"
6050 PRINT AT 15,0;"(4) RE-INST
ATE COLUMN TOTALS"
6060 PRINT AT 20,0;"(5) RETURN
TO MAIN MENU"
6070 PRINT #0;AT 1,0; INVERSE 1;
"SELECT APPROPRIATE NUMBER ": PA
USE 0
6080 IF INKEY$="1" AND LINT=1 TH
EN LET LINT=0: LET WIDTH=WIDTH-
8
6090 IF INKEY$="2" AND LINT=0 TH
EN LET LINT=1: LET WIDTH=WIDTH+
8
6100 IF INKEY$="3" AND COLT=1 TH
EN LET COLT=0: LET W=W-1
6110 IF INKEY$="4" AND COLT=0 TH
EN LET COLT=1: LET W=W+1
6120 IF INKEY$="5" THEN RETURN
6130 GO TO 6000
6140 REM CLEAR NUMERIC DATA
6150 FOR M=1 TO PAGES
6160 FOR N=1 TO LINES
6170 LET A$(M,N,9 TO )=""
6180 NEXT N: NEXT M
6190 GO SUB 9320
6200 RETURN
6500 REM WAFER DIRECTORY
6510 LET D$=D$+":": CAT *D$
6520 PRINT #0;AT 0,0; INVERSE 1;
"PRESS ANY KEY TO CONTINUE": PAU
SE 0
6530 RETURN
7000 REM CURSER LEFT
7010 IF C<9 AND C>0 THEN RETURN

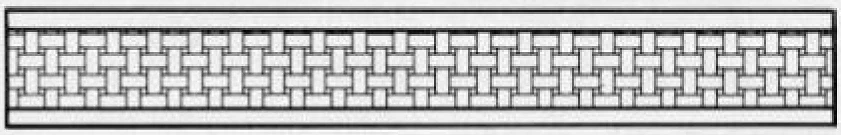
7020 IF Y<8 THEN GO SUB 2320
7030 RETURN
7040 REM CURSER UP
7050 IF L<1 AND L>-1 AND P=1 THE
N RETURN
7060 IF X<1 THEN LET P=P-1: GO
SUB 2380
7070 RETURN
8000 REM ATTRIBUTES
8010 CLS : INPUT "BRIGHT?";BRI:
INPUT "PAPER COLOUR? ";PAP;,;"IN
K COLOUR? ";INK: BRIGHT BRI: PAP
ER PAP: BORDER PAP: INK INK: CLS

8020 RETURN
8030 REM TOTALS-JUSTIFICATION &
 CORRECTION FOR TO MANY DIGITS!
8040 IF LEN STR$ TOT>7 THEN BEE
P .5,.5: LET COR=1: RETURN
8050 LET Y$=STR$ TOT
8060 IF LEN Y$<7 THEN LET Y$="
```

```
"+Y$: GO TO 8Ø6Ø
8Ø7Ø RETURN
85ØØ REM  SUBTOTAL JUSTIFICATION
851Ø IF LEN E$<7 THEN  LET E$="
"+E$: GO TO 851Ø
859Ø RETURN
9ØØØ REM  FORMAT
9Ø1Ø CLS : PRINT  FLASH 1;AT 1Ø,
5;"ARE YOU CERTAIN? (Y/N)": PAUS
E Ø: IF INKEY$="N" THEN  RETURN
9Ø2Ø CLS : PRINT ; INVERSE 1;AT
8,Ø;"ENTER THE NUMBER  OF 8 CHAR
ACTERWIDE COLUMNS YOU REQUIRE. D
O NOTINCLUDE TOTALS OR TITLES CO
LUMNS              MAXIMUM 15
    ": INPUT WIDTH
9Ø3Ø LET WIDTH=(WIDTH+2)*8: IF W
IDTH>136 THEN  CLS : PRINT ; INV
ERSE 1;AT 1Ø,1Ø;"TO MANY COLUMNS
!": PAUSE 15Ø: CLS : GO TO 9Ø2Ø
9Ø4Ø IF WIDTH>8Ø THEN  CLS : PRI
NT  INVERSE 1;AT 1Ø,Ø;"YOU MUST
SELECT CONDENSED         PRINTING
IN THE PRINTER ROUTINE ": PAUSE
1ØØ
9Ø5Ø LET COR=Ø: LET LINT=1: LET
COLT=1: LET CO=Ø: LET W=99: LET
PAGES=INT (W/2Ø)+1: LET VAST=6:
LET LINES=2Ø
9Ø6Ø DIM A$(6,2Ø,WIDTH)
9Ø7Ø CLS
9Ø8Ø LET A=INT (WIDTH/8)-2: PRIN
T AT 5,5;"ENTER THE NAMES OF:-";
'';TAB 5;"UP TO ";A;" COLUMN TIT
LES"
9Ø9Ø PRINT AT 1Ø,3;"EACH TITLE I
S LIMITED TO A ";'';: PRINT ;TAB
 3;"MAXIMUM OF  7  CHARACTERS!"
91ØØ PRINT AT 15,Ø;"INPUT S WHEN
 YOU HAVE ENTERED   ALL THE COLU
MN TITLES REQUIRED. "
911Ø PRINT AT 2Ø,Ø;"PRESS ENTER
FOR A BLANK TITLE  "
912Ø FOR N=9 TO WIDTH-8 STEP 8:
PRINT  INVERSE 1;AT Ø,Ø;"ENTRY "
;INT (N-1)/8
913Ø GO SUB 946Ø
914Ø IF Z$="S" OR Z$="S" THEN L
ET WIDTH=N+7: GO TO 917Ø
915Ø LET A$(VAST,1,N TO (N+6))=Z
$
916Ø NEXT N
917Ø LET A$(VAST,1,N TO (N+6))="
TOTALS"
918Ø CLS : PRINT AT 7,5;"ENTER T
HE NAMES OF:-";'';TAB 5;"UP TO 9
9 LINE TITLES"
919Ø PRINT AT 13,3;"EACH TITLE I
S LIMITED TO A ";'';: PRINT ;TAB
 3;"MAXIMUM OF  7  CHARACTERS!"
92ØØ PRINT AT 18,Ø;"INPUT S WHEN
 YOU HAVE ENTERED  ALL THE LINE
  TITLES  REQUIRED. "
921Ø PRINT AT 21,Ø;"PRESS ENTER
FOR A BLANK TITLE  "
922Ø LET COUNT=Ø: FOR M=1 TO 5:
FOR N=1 TO 2Ø: LET COUNT=COUNT+1
9225 IF COUNT=1ØØ THEN  GO TO 92
9Ø
923Ø PRINT AT Ø,Ø; INVERSE 1;"EN
TER LINE  ";COUNT
924Ø GO SUB 946Ø
925Ø IF Z$="S" THEN  GO TO 929Ø
926Ø LET A$(M,N,1 TO 7)=Z$
928Ø NEXT N: NEXT M
929Ø LET A$(M,N,1 TO 7)="TOTALS"
93ØØ LET PAGES=M: LET W=(2Ø*(M-1
)+N)
93Ø5 IF LINES<21 THEN  LET LINES
=LINES+1
931Ø IF LINES=21 THEN  LET LINES
=2Ø
932Ø CLS : PRINT  INVERSE 1;AT 1
Ø,2;"DO YOU WISH TO ENTER COLUMN
 ": PRINT  INVERSE 1;AT 12,1Ø;"M
ARKERS? Y/N": INPUT  LINE Z$: IF
 Z$="N" THEN  CLS : GO TO 935Ø
933Ø CLS : PRINT  FLASH 1;AT 1Ø,
1Ø;"PLEASE WAIT!": FOR O=1 TO PA
GES: FOR N=1 TO LINES: FOR M=8 T
O WIDTH STEP 8: LET A$(O,N,M)=":
": NEXT M: IF (O-1)*2Ø+N=W THEN
 CLS : GO TO 935Ø
934Ø NEXT N: NEXT O: CLS
935Ø LET S$="      "
936Ø FOR N=1 TO (WIDTH-8) STEP 8
: LET S$=S$+":       ": NEXT N:
LET S$=S$+":"
937Ø LET R=Ø
938Ø LET U$="": FOR N=1 TO 32: L
ET U$=U$+" ": NEXT N
94ØØ LET R$="      "
941Ø FOR N=1 TO (WIDTH-8) STEP 8
: LET R$=R$+":_______": NEXT N:
LET R$=R$+":"
942Ø LET T$="      "
943Ø FOR N=1 TO (WIDTH-9): LET T
$=T$+"_": NEXT N
944Ø RETURN
945Ø REM : GO SUB
946Ø INPUT  LINE Z$: IF LEN Z$>7
 THEN  PRINT  FLASH 1;AT 2Ø,Ø;"I
NCORRECT! RE-ENTER!": PAUSE 5Ø:
PRINT AT 2Ø,Ø;"
  ": GO TO 946Ø
947Ø RETURN
```

EXPENSES

MAR 85		HOTEL	MEALS	DRINKS	FARES	SUNDRY	TOTALS
	1				2.65	1.80	4.45
	2						0
SUN	3						0
	4		9.54	3.44			12.98
	5	20.30	6.32			1.00	27.62
	6						0
	7				12.54		12.54
	8						0
	9						0
SUN	10						0
	11						0
	12		4.25		8.62	.90	13.77
	13	21.65					21.65
	14					1.23	1.23
	15						0
	16	18.44	5.00	2.96	5.08		31.48
SUN	17						0
	18						0
	19		4.63	1.91			6.54
	20						0
	21				2.45	.90	3.35
	22	20.35	12.35				32.7
	23					1.32	1.32
SUN	24		5.79	4.56			10.35
	25						0
	26						0
	27	18.44		2.45	1.65		22.54
	28						0
	29		2.45		.98		3.43
	30						0
SUN	31						0
TOTALS		99.18	50.33	15.32	33.97	7.15	205.95



Program 2. Kempston E interface code to replace main program lines

```
3000>REM PRINTER CODES
3010 CLS :
3020 COPY : REM /1
3030 POKE 23679,WIDTH
3040 PRINT ; INVERSE 1;AT 0,19;"
PRINTER CODES"
3050 PRINT ;AT 0,0;"(1)  COMPRES
SED";'';"(2)  ENLARGED";'';"(3)
 SUBSCRIPT";'';"(4)  IMPRESSED";
'';"(5)  ITALICS";'';"(6)  BOXED
";'';"(7)  SET LEFT MARGIN ";'';
"(8)  DOUBLE STRIKE";'';"(9)  LI
NE SPACING";'';"(P)  LLPRINT DAT
A";'';"(M)  MAIN MENU"
3060 PRINT ;AT 2,19; INVERSE 1;"
ENTER  NUMBER";AT 3,19;"  REQUIR
ED.  ": PAUSE 0: IF INKEY$="P" T
HEN  GO TO 3180
3070 IF INKEY$="1" THEN  LPRINT
CHR$ 27;CHR$ 15
3080 IF INKEY$="2" THEN  LPRINT
CHR$ 27;CHR$ 27;CHR$ 87
3090 IF INKEY$="3" THEN  LPRINT
CHR$ 27;CHR$ 27;CHR$ 83
3100 IF INKEY$="4" THEN  LPRINT
CHR$ 27;CHR$ 27;CHR$ 69
3110 IF INKEY$="5" THEN  LPRINT
CHR$ 27;CHR$ 27;CHR$ 52
3120 IF INKEY$="6" THEN  LET R=1
: CLS
3130 IF INKEY$="7" THEN  GO SUB
3320
3140 IF INKEY$="8" THEN  LPRINT
CHR$ 27;CHR$ 27;CHR$ 71
3150 IF INKEY$="9" THEN  GO SUB
3380
3160 IF INKEY$="M" THEN  RETURN
3170 GO TO 3030
3180 CLS : PRINT #0;AT 0,0; INVE
RSE 1;"SET PAPER POSITION & PRES
S ENTER": PAUSE 0
3190 INPUT ; INVERSE 1;"INPUT ""
TITLE"" OR ""ENTER""";Z$
3200 LPRINT ;AT 0,8;Z$: LPRINT
3210 LPRINT ;A$(VAST,1,1 TO WIDT
H)
3220 FOR M=1 TO PAGES: FOR N=1 T
O LINES
3230 IF LEN T$>=WIDTH AND M=1 AN
D N=1 AND R=1 THEN  LPRINT ;T$(1
 TO WIDTH)
3235 IF LEN T$<WIDTH AND M=1 AND
 N=1 AND R=1 THEN  LPRINT ;T$
3240 IF R=1 THEN  LPRINT ;S$(1 T
O WIDTH)
3250 LPRINT ;A$(M,N,1 TO WIDTH)
3260 IF R=1 THEN  LPRINT ;R$(1 T
O WIDTH)
3270 IF ((M-1)*20)+N=W THEN  GO
TO 3290
3280 NEXT N: NEXT M
3290 LET R=0
3300 LPRINT CHR$ 27;CHR$ 27;CHR$
 64
3310 RETURN
3330 INPUT ; INVERSE 1;"NUMBER O
F CHARACTER SPACES FOR  MARGIN
                        ";Z
3340 COPY : REM CHR$ 0
3350 LPRINT CHR$ 27;CHR$ 77;CHR$
 Z
3360 COPY : REM CHR$ 1
3370 RETURN
3380 PRINT AT 10,0; INVERSE 1;"N
UMBER PIXELS FOR LINE SPACING  E
NTER: 8 = NORMAL: 6 = SUBSCRIPT4
 = COMPRESSED SUBSCRIPT         "
: INPUT Z
3390 COPY : REM CHR$ 0
3400 LPRINT CHR$ 27;CHR$ 65;CHR$
 Z
3410 COPY : REM CHR$ 1
3420 CLS : RETURN
```

Across the Pond

by Mark L. Fendrick

It has been more than a year and a half since Timex left thousands of us in the lurch, but as you can see, we haven't disappeared or 'given up the chip'. This past year has seen many new products appear for our computers. Many of these are from the United Kingdom, where the Spectrum (and Spectrum+) is still a popular microcomputer. A few hardware items have appeared as well, some developed specifically for the Timex adaptations in addition to modified Spectrum compatibles.

Some of the most important add-ons which became quite popular in the last year were those devices which enabled the Timex/Sinclair 2068 to run Sinclair ZX Spectrum software. Unlike the situation here in the States, literally thousands of titles exist for the Spectrum in Europe and other parts of the world. Until now a good portion of the available Spectrum software would not work due to differences in the two operating systems. (Some software written in BASIC would load and run, but the majority of the best programs contain varying degrees of machine code and do not work on the American machine.)

ROM and EMU

The EMU series of Spectrum emulators were the first of these devices to appear on the market — developed by Douglas Dewey of the Triangle Sinclair Users Group (206 James Street, Carrboro, NC 27510). For those of you unfamiliar with this emulator, it is a circuit board which is inserted into the Command Cartridge port and replace the standard T/S 2068 operating system with a pseudo-Spectrum operating system. Using this device, the vast assortment of Spectrum software, which was previously unable to operate on a T/S 2068 will work just fine.

A second emulator which became available through many Sinclair distributors this year, was the ROMSWITCH, developed by G. Russell Electronics (R.D. 1, Box 539, Centre Hall, PA 16828; (814) 364-1325). Unlike the EMU emulator, this device gets permanently installed inside your computer, and is manipulated by way of a magnetic switch which sits on top of the keyboard. This does require opening of the computer, but is quite simple to install, although most dealers who sell this device also provide (for a small fee) installation service. As I explained in my earlier review of the ROMSWITCH, however, the installation requires no cutting or drilling, is accomplished using nothing more than a screwdriver, and is simple enough to follow the instructions and run Spectrum software in about five minutes.

But, if you wanted to use any of the Spectrum hardware peripherals, a Spectrum ROM is not enough. When Timex released the T/S 2068, for some reason they reconfigured the expansion bus and removed the 9V power which is present on the Spectrum bus. Because of this, add-ons developed for the Spectrum are inoperable on a T/S 2068. This too has been remedied in 1985 with the Z-link. This device, when attached to a T/S 2068 containing an emulator of one sort or the other, reconfigures the Timex bus while adding the 9V required to run many Spectrum designed add-ons. Among the dealers offering the Z-link are T.E.J. Computer Services (859 N. Virgil Avenue, Los Angeles CA 90029; (213) 665-5111) and Curry Computer (5344 W Banff, Glendale, AZ (602) 978-2902).

For those who want both the Spectrum software and hardware emulation in one device, Damco Enterprises (67 Bradley Ct, Fall River, Mass. 02720; (617) 678-2110) has marketed a device which they call the Rainbow Plus interface. This interface contains both features necessary to run Spectrum software as well as to attach Spectrum hardware all in a single cased device. The Timex Command Cartridge port is available for those few Command Cartridges which were made available, and allows switching back and forth between modes.

UK sources

With all these emulators now available, US owners needed a source for Spectrum hardware and software. Many of the dealers who sell these emulators are stocking up on programs and add-ons from the United Kingdom. Among these, although by no means limited to these vendors alone, are Curry Computer, Damco Enterprises, Zebra Systems (78-06 Jamaica Avenue, Woodhaven, New York 11421; (718) 296-2385), and the English Micro Connection (15 Kilburn Court, Newport, RI 02840; (401) 849-3805). The English Micro Connection handles both Spectrum software as well as selling the Spectrum+ along with all of the popular add-ons. (You may want to keep in mind that although there are devices which allow you to use both Timex and Sinclair software and hardware on your T/S 2068, there is no device which allows the opposite transformation. Owning a Spectrum eliminates the possibility of using most products designed for the T/S 2068.) One company, however, continues to take some of the most popular Spectrum software and modify it to work on the T/S 2068, often adding the ability to utilize many of the Timex's advanced features, such as joystick control. Knighted Computers (707 Highland Street, Fulton, NY 13069; (315) 593-8219) has obtained rights to translate all of Quicksilva's Spectrum line. In addition to the many fine games (such as Fighter Pilot — modified to use the Timex joystick port) Knighted Computers also has many fine serious applications software as well.

One of the best, and most inexpensive ways of getting British software is from the dealers in England themselves. The dollar is still quite strong as compared to the British pound, and usually this results in the price being lower when ordering direct. Many British dealers accept MasterCard and/or Visa which makes the handling of the exchange of currency quite simple as the bank handles all of that for you. The most efficient company I have discovered to date also has the most extensive catalogue I have yet seen. To make matters even better, their prices are quite low, while the quality of their service is quite high. On any order I have placed with them, I have received my tapes within ten days. (I have often had to wait longer for programs from American companies). Write to Speedysoft (37 Church Road, London SW13 9HQ, England) for your copy of their large catalogue.

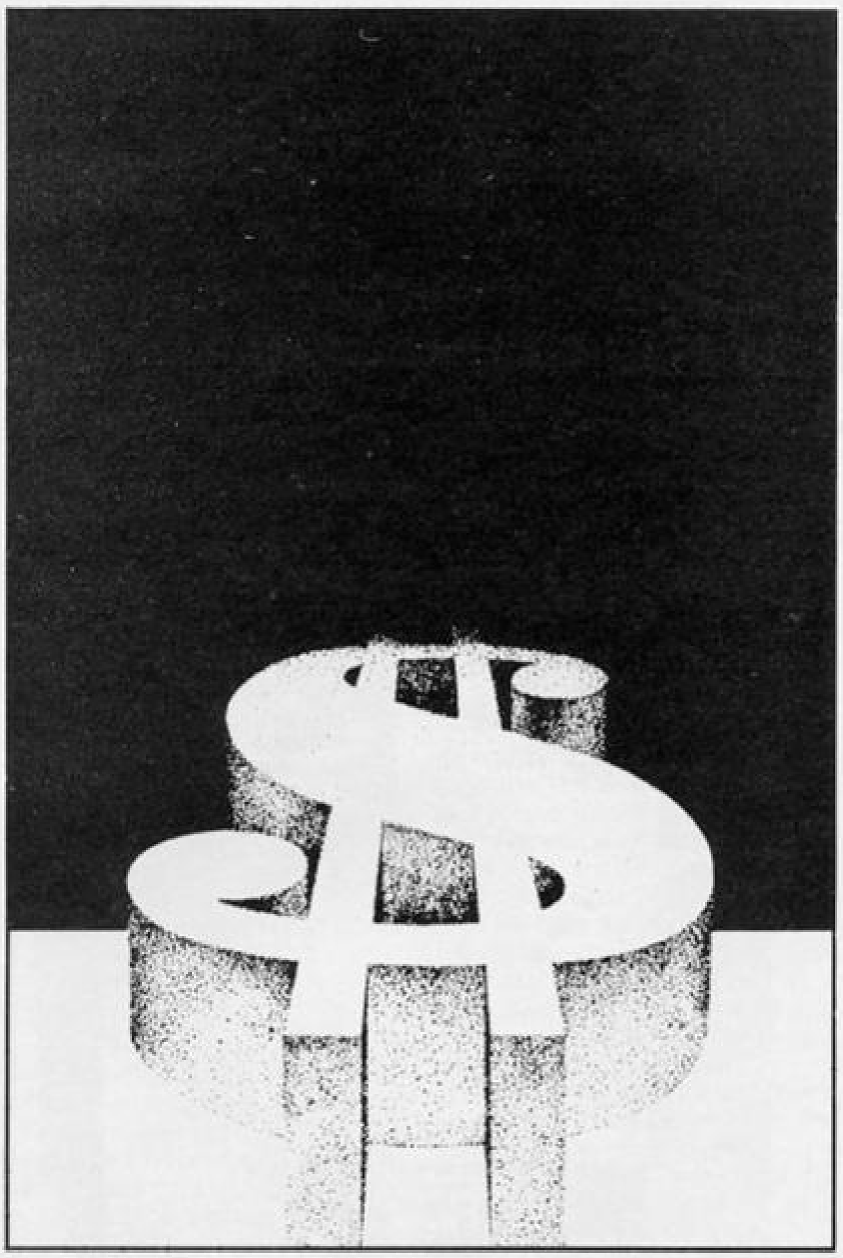
Mass storage

In 1984 the most eagerly anticipated release was the modem for the T/S 2068, and then the Smart II software to accompany it. In 1985 the prize was mass storage devices. As advanced as the T/S 2068 is, it is handicapped by the necessity of using a cassette based mass storage system — slow and clumsy — with no method of automatically turning the cassette player on or off. One of the features which drew many of us to the T/S 2068 in the first place was the promise of microdrives such as those available for the ZX Spectrum. Of course, Timex abandoned us before they brought it to market, so third party designers stepped in and took up the slack. Unlike the modem, which was already designed and ready for release, independent developers had to work from scratch to meet the need. Today the Sinclair owner is in a position quite unfamiliar in the past, and a choice of systems is available from which to choose. Those who want a traditional disk drive system have at least two from which to choose. AERCO (Box 18930, Austin, Texas 78760; (512) 451-5874), which has been producing interfaces for the Sinclair computers since almost the beginning, has finally released its long advertised disk drive system. A second system has been developed and marketed by Ramex International (17620 26 Mile Road, Washington, Michigan; (313) 781-5800). To compare system specifications write to both companies and request more information.

Also now available is a microdrive for the T/S 2068. Although this is not the system promised by Timex, it is from a company which has been involved with the Timex computer from the time when the T/S 1000 was the only micro in the line. The A&J Microdrive Com-

pany (1050 East Duane Avenue, Suite 1, Sunnyvale, CA 94086; (408) 732-9292) first developed a microdrive with interface for the T/S 1000, and when the T/S 2068 came onto the marketplace they responded with the compatible model. Utilizing a stringy floppy wafer which measures one and three quarter inches by two and one half inches by one quarter of an inch, their operating system comes on an EPROM which requires very simple additions to the LOAD and SAVE statements to activate the micro-drive. With much increased speed, and automatic on/off under software control, this reasonably priced system solves many of the problems of the original cassette based mode. To make this package even more attractive, the A&J interface allows use of the cassette port, and contains a parallel printer interface.

A final mass storage system, believe it or not, is from Timex Computer Corporation! No, not the group formerly headed by Dan Ross in Waterbury, Coneticut, but by Timex of Portugal. Zebra Systems has signed an agreement with Timex of Portugal to import the TC 2068 system to this country. This is a T/S 2068 look-alike with an American ROM and a Spectrum compatible expansion bus. The computer also comes with a Spectrum emulator (which does not work with the T/S 2068) giving this computer, nicknamed the Silver Avenger, the best of both machines. Designed as part of this system is a matching 3½ inch disk interface and drive. Zebra Systems has made this disk system available, not only for the TC 2068, but for the T/S 2068 as well.



Zebra

While we are on the subject of Zebra Systems, you would certainly want to write for their catalogue, currently the largest Timex/Sinclair catalogue around One of the reasons for this is that Zebra still actively supports the Timex line; carrying most of what is available from other sources as well as continuing to produce new products of their own for our machines. Last year they released two excellent hardware developments — the ZebraTalker II and the Zebra Graphics Pad — for the T/S 2068. They backed up these products with some excellent software to go with both. ZebraTalker II comes with two fine programs to assist in creating the speech you require from your speech synthesizer. The phoneme editor helps you to create the phoneme strings utilized by the device, and add them to your own programs. The Text-to-Speech software (which you can merge with any program you have, or write) allows you to type in text, which automatically gets converted and sent to the ZebraTalker. Nothing could be simpler.

The Zebra Graphics Tablet is an interface designed to connect a supplied Koala Graphics Tablet to your T/S 2068. The software provided allows you to 'draw' on the tablet with a stylus (included) and have that 'drawing' transferred to your TV or monitor screen. Copies can be sent to your T/S 2040 printer if you desire. Two new releases also work with your Zebra Graphics Tablet — Coloring Book and Tech-Draw. Coloring Book is terrific for the children who are always around wanting to use your computer. A number of pre-drawn circus scenes are available for the kids to color using the simple menu provided. Unlike traditional coloring books, a child can 'undraw' anything, and the picture can always be restored to its original uncoloured condition simply by reloading the software. A second program — Tech-Draw — comes with features such as various textured shadings, brush strokes, selectable input and output (to a T/S 2040 printer or a full size printer in two sizes) on convenient pull down menus. Of course you may save any of your creations.

D.I.Y.

Any of you who regret missing the time, in 1981/2, when Sinclair offered the ZX81 as a do-it-yourself kit, here is your second chance. Both Zebra Systems and Sunset Electronics (2254 Taraval Street, San Francisco, CA 94116; (415) 665-6161) are now offering the kit once again. They come with all parts and instructions as well as a limited warranty. This is a great item for user groups as quantity discounts are available. They would make fine presents too. (Personal note to my wife, kids, parents or whoever — I wouldn't mind getting one!) Remember that anything still available for the T/S 1000 will work on the ZX81.

Before we leave the topic of graphics, I would like to remind you about three fine programs. Both Multi-Draw (Knighted Computers) and Draw II (Peech II) are multi-featured graphics programs which produce excellent results. A new entry in the field is Pixel Sketch and Graphics Editor from Lemke Software Development (2144 White Oak, Wichita, KS 67207; (316) 687-0315). I am now putting this program to a full test but in the meanwhile you may want to write to Lemke Software fo their full catalogue.

There are still many products which I have simply not had a chance to fully test yet, which will be topics in future columns. One of the most interesting currently on my desk is from G. Russell Electronics. It is an experimental program for the T/S 1000 (and T/S 1500 and ZX81 of course) to create multicoloured graphic scenes on your black and white TV with no hardware changes or additions other than an optical screen which goes over your TV screen. You are supposed to be able to paint in 9 colours including various shades of red, blue, yellow, black and white. I am quite anxious to try this (gotta find a black and white set) and will report to you as soon as I do.

I was saddened to hear, as I prepared to write this month's column, that Hawg Wild Software was throwing in the towel and going out of business. Your presence shall be missed Gary.

You may also want to write to the following companies for copies of their Sinclair related catalogues:

E. Arthur Brown Company, 3404 Pawnee Drive, Alexandria MN 56308, (612) 762-8847.

Heath Computer Services, 950 East-52 South, Greentown, IN 46936, (317) 628-3130.

Twenty-first Century Electronics, 6813 Polk Street, Guttenberg, NJ 07093, (201) 869-2616.

Any dealers that I missed please accept my apologies, and send me a copy of your current catalogue.

All At 'C'

We take a close look at Metacomco's version of the C language.

This is a package designed for the professional C programmer, but is also user friendly enough to be considered by the home user. As can be expected for such a specialist program, the cost is high at £99.95, but for this you get a plug in EPROM containing part of QLC, two cartridges with the compiler phases 1 and 2, and a third cartridge with the Screen Editor, C run time system and the linker. Also included is a 200+ page manual. Before looking at the package in depth it may be worthwhile looking at the language.



The C Language

Although Metacomco say C is a high level language it is generally considered to be a medium level one and was designed for general purpose applications on the UNIX operating system by Dennis Ritchie. This language has several advantages. For a start it is a compiled language which means that the final code is in the machine language of the processor and so will perform at very high speed. Secondly, it has excellent data structures and fairly structured control flow. Portability is a major advantage of the language, a program written in C for the Hisoft D compiler for the Spectrum will work on any other C compiler, providing, of course, no machine specific code has been used.

Due to this portability a large library of general functions are available which saves having to program many routines yourself. C has many followers who are ardent fans, but to be fair, it also has its critics.

Metacomco's C

This is a full version which is as compatible with the original as is possible. Designed by Lattice, it is based in their tried and tested 8086/88 C compilers and includes a large library of UNIX and QDOS functions, full floating point arithmetic, Macros and extensive error trapping and messages.

The screen editor is the main unit for creating C routines and is very flexible, with a large set of cursor and editing commands, user defined windows and the ability to run multiple versions. The linker will take the files created by the editor and the library and link them together before compilation into the final program code.

In Use

OK, so far all this could be gleaned from the press release and advertising claims of Metacomco, now we come to the acid test. Using it.

For a start, and Metacomco admit this, the microdrive tapes are a risky media for storing such an expensive program. Backup tapes are essential, and preferably a disk drive for maximum security. I used a 40 track with the Technology Research interface and I have not had any problems with my copies, although Metacomco are slack in not providing any built in backup routines. Users at this level are unlikely to possess similar quality equipment. Most importantly, even though the manual is a well written and lengthy tome, it is a 'functional description' only and no teaching of the C language is undertaken. Users are assumed to be proficient and if not they are directed to the 'C' bible, *The C Programming Language* by B.W. Kernighan and D.M. Ritchie and published by Prentice-Hall. An alternative is *C at a Glance* by A. Denning and published by Chapman and Hall.

The manual covers the usage of all the programs and gives in detail the few departures from the standard. The portable library is likewise explained in detail. Some of the library programs are concerned with memory allocations, some are I/O routines and finally, there are a set of Macros for general file, string and mathematical operations.

The Editor is a joy to use, it can be soon mastered and entering programs and routines is simplicity itself. However, using the compiler is a fairly lengthy business and needs to be approached carefully and step by step. Experienced programmers will not find any problems but the novice may find it confusing.

Once the program or suite of routines has been created onto tape or disk then the first part oft the compiler is used. This compiles the source programs into an intermediate code ready for use by the second part of the compiler. Finally the object code is linked to any other routines and the completed program may be saved.

Opinion

This must be the definitive C compiler for the QL. Everything is provided for the experienced programmer, and if they are competent in C they will find it easy to use this well produced version. I entered the sample programs supplied and also a couple of others that I had developed on the Spectrum and all compiled and operated without any problem. It seemed too good to be true!

For novices or those wishing to learn it could be looked at as an investment, if you approach it seriously then all the features you could ever want are provided.

The price makes it prohibitive for the home dabbler and you must be certain that you will be intending to get full value out of the program. It is perhaps wise to buy a teaching book to study before investing in this program (you'll need it anyway).

Finally yet another moan about the microdrives. I know it isn't Metacomco's fault, but after making only one backup copy one of the tapes failed. A frustrating and expensive problem.

QL C — priced £99.95 is available from Metacomco, 26 Portland Square, Bristol BS2 8RZ.



Quicksoft

Clive Smith tests his skill and strategy in this software selection.

Waterloo
M.C. Lothlorien
£9.95

Ever since I saw Rod Steiger storming around as Napoleon I've been interested in this battle. Unlike most wargames for the computer you do not command the British side or the historical winners, yep, you get lumbered with being Napoleon.

Although cast as the underdogs, a few liberties have been taken in order to enhance the playability of the game, the French army has been increased to five corps of infantry instead of four, and the Prussian army will arrive earlier than in reality to make your task a little more difficult. Purists may not approve.

The game is played by means of graphics and single key presses form a series of option menus. This allows for an unexpected variety of actions to be taken quickly and easily.

The playing area was a little small and at first I was confused due to the booklet map being printed with the French army at the bottom and the English at the top, but onscreen the map is rotated 90 degrees clockwise. I spent quite a while trying to move the wrong army.

Once I began to play properly I soon mastered the first, and easiest, of the three levels and achieved a decisive victory on my second play. For what appears a simple, slow, intellectual exercise I found it unaccountably gripping and addictive.

Not tonight Josephine, I'm going to have another whack at Wellington.

OVERALL * * * *





321 Family Quiz
TBD
£9.95

Everything is thrown into this blatant attempt at exploiting YTV's (inexplicably) successful show. Ted Rogers narrates the instructions and presents each section on the tape, and a wide range of prizes from toy Dusty Bins to a seven day holiday in Spain is up for grabs.

The program is in three sections and will operate on all Spectrums including the few 16K versions still in existence, no source of possible sales has been overlooked!

Section one is the quiz part and three families take turns in answering general knowledge questions by pressing True or False. Section two is a simple arcade sequence and section three is a lucky dip, with not even the convoluted clues of the original TV program to 'help'.

Fans of 321 will possibly find something of interest here and so might avaricious individuals, although it is worth pointing out that even if you achieve everything possible you do not get the prize but only an entry in the 'Grand Draw' for these prizes. It is realistic in that the game had the same effect on me as the TV show, I fell asleep! Personally I think this program would be better stuffed into Dusty Bin!

OVERALL *

Rothmans Football Quick Quiz
Cassell Ltd
£8.95

Here is a 'just for fun' quiz, no tie-in with famous personalities or TV shows, no offers of fabulous prizes, in fact the worst that it could be accused of is the plug for Rothmans.

For fans of the art of spherical dexterity this is a challenging test the knowledge, 18 sets of questions totalling 1000 questions in all, and covering every aspect from general, to trivia and non league football.

The quiz is well presented, giving three variations in play format, Assigned, Three in a Row and the Race. A full quiz can be played which involves a combination of all three.

Not a lot to add, except that it is a good example of how the quiz can be implemented on a computer and it is a must for football fanatics.

OVERALL * * * *

Endurance
CRL
£7.95

Beware! From the picture on the cover you may think that this is an arcade game — not so. This is in fact a strategy and tactical game *par excellence,* if this game is bought by mistake then it may well convert a few hardened arcade addicts.

One to six players can compete and the keys are redefinable or a Kempston joystick can be used. Games may be saved to tape to allow you to continue with a game later on.

The first stage is in selecting the bike components and the riders, this is done by choosing between options displayed graphically. During the race messages will be given and you can send instructions to your riders. Wear and tear must be dealt with as well as refuelling. Unexpected problems such as headlamp failure and crash damage will add to your headaches.

As a motorbike fanatic I loved this game and I suppose you had better take that into account when looking at my rating, I find the arcade simulations of motorcycle racing unsatisfying but the program seemed to produce all the atmosphere and excitement of the track. I felt sorry for the unsung managers of the teams after playing this.

OVERALL * * * * *

Strongman
Martech
£7.95

Oh no, I thought, my TAC2 'indestructable' joystick had just snapped whilst playing Supertest, and I couldn't afford to get another to test a similar game.

Well, there is an interesting option in this game. The infamous left/right action only has to be done at the start of the game to set the overall strength which is split between each muscle, thereafter it becomes a matter of strategy in assigning the amount of power and effort each muscle puts into each task.

Fortunately for me, the 'training session' of building up your strength can be bypassed and a random amount of strength is allocated. The tasks are Truck Pull, Log Chop, Barrel Loading, Car Roll, Fairground Bell, Sumo Wrestling.

During each event some action, timing the pressing of the fire button etc, is required and I was not going to get out of the L/R action that easily, for Barrel Loading and Fairground Bell we were back to it and the keyboard had to suffer for the sake of this review.

Martech have tried to do something a bit different and have succeeded on the whole, the graphics are not as detailed as in some varieties of this game, but the slightly more varied gameplay and extra thought required make up for it. Worth your consideration.

OVERALL * * * *

Spectrum Lessons

By the time you read this the new government scheme to provide additional educational software support for schools should be well under way. This scheme will make new programs or the equivalent money available to schools, the differing procedures dependent upon the individual Education Authorities.

If you are the teacher responsible for purchasing new software then unfortunately the age old problem of suitability still exists. If you are lucky enough to have access to a Teachers' Centre with a software library for reference then the problem is not so bad. Often however, word of mouth recommendation or impartial reviews are the only means by which it is possible to be sure of obtaining the right program for your needs.

Classroom Adventures

I personally must admit a particular preference for adventures within the classroom. It is possible, with a certain amount of guidance from the teacher, or even parent if these are used at home, to extend an adventure program into the basis for a whole curriculum topic.

Jack in Magicland has been available for some time now and is the first in a trilogy of adventures for children aged 6-12. All have been written by a Primary School teacher and compiled with *The Quill*, the adventure writing aid by Gilsoft.

On first impressions there is nothing spectacular to make you leap with anticipation, no loading screen and only a block graphic title page. However, the delights await within.

The first adventure is based upon the story of Jack and the Beanstalk and is text only. I tried this with several groups of 9-10 year olds and they found no difficulty with the readability of the text although it would probably be rather heavy going for the average 6 year old.

The story begins with the pupil taking the part of a very lazy Jack, reluctantly entrusted to go and sell the last remaining item of value, the family cow. Once accomplished the adventurer proper begins.

As with all adventures each location is described for the player and a response is then expected. What makes this adventure so real are the very atmospheric descriptions. The children loved them and were in no way disappointed by the lack of graphics. Indeed this is a plus point in that they can go away and recreate their own impressions of the locations and the characters which they meet. Despite the fact that there are no pictures the interest is maintained by the text and by careful use of colour in paper and ink which go someway to adding to the scene description.

Keyboard entries are simple, using NORTH, SOUTH, or the standard verb/noun statements such as GET SWORD, GIVE BOTTLE, or abbreviations. Some text is lit up to provide clues for the next action. At some points these represent the only course of action so it is wise to take heed of them!

The children I tried this with worked in groups and took great care in decision making, especially after their first attempt resulted in being sent to bed by Jack's mother for being foolish! It was encouraging to see the amount of discussion that took place, even from children who normally took little part in class activities. As the adventure proceeded it became harder and harder to get them away from it, they were delighted at every new location and puzzle!

Working through the adventure the children discovered many locations and puzzling situations. This gave plenty of opportunity for them to decide the necessary form of commands to give the computer. The brief duplicated Teachers' Notes suggest that the program will encourage reading and spelling techniques and this undoubtedly is the case, if only for the fact that the computer will not accept incorrect spellings!

Watching the children play this adventure it was possible to see many ideas which can be extended into other areas of the timetable and overall I felt that the program has a great deal of potential. Language work is just one area in which the possibilities are almost endless.

On the minus side are a few minor points. Lots of text to read on a single screen, and a few idiosyncrasies have crept into the storyline (in the giant's treasure room it is impossible to lift a reel of thread but you can carry a chest of treasure). Care needs to be taken too when using the REDESCRIBE option, this can occasionally put you back in a situation from which there is no way out!

For those who require graphics, Turtle will provide a photocopied booklet of delightfully amusing illustrations and a map.

The notes supplied provide all the answers for teachers without the time to go fully through it together with a few related ideas for further work. I feel that this is one area of the package that could have been more substantial for those who do not have the ideas flowing from their fingertips, but on the whole this, in my opinion, is a worthwhile and value-for-money program. And the verdict of the children? 'Great!'

Pirates!

The third of the adventure trilogy, *Jack and the Pirates* moves away from a fairy story setting and puts Jack in the days of pirates and Long John Silver.

For me this does not have the same initial appeal or the amusing descriptions, but the further the children got into the storyline the more possibilities became apparent. The problems are more complex here and a map soon becomes essential. This is a worthwhile exercise in each of the adventures and again, can lead to a lot of follow-up work.

As well as looking out for themselves in this adventure it is also necessary for the players to take care of a certain character encountered at the start, he can help you out if you don't lose him.

As a basis for project work these adventures have been well structured and offer considerable potential. They do not contain a wealth of related suggestions and this might be an area for improvement in the future but, with a little thought and time they could be very valuable additions to your Spectrum educational library.

Halley's Comet

Finally to something entirely different; *Halley's Comet (Your Own Planetarium)*. In view of the current mania sweeping certain sections of our populace this is very timely although by no means original in idea.

There seems to be a superabundance of astronomy programs at the moment, however this deals specifically with Halley's Comet and after only a short time in which to look at it seems to be an extremely detailed program.

It is possible to go backwards and forwards in time to see the differing star/planet configurations for any given date. There are extensive options for viewing planetary motions and star charts as well as being able to use one of the two programs as a computer equivalent of an Orrery (model of the solar system!).

An almost endless list of key functions puts you in command of your own computerised planetarium and these take a little getting used to. A little practise however soon makes these second-nature.

The program has zoom facilities as well as being able to follow movements of planets and stars in daylight. One rather silly suggestion is to take your television outside at night to compare your display with the night sky. Notwithstanding this however, the program seems very competent. It has a comprehensive duplicated booklet which is very necessary to get used to all the different keys!

If you require a program to keep tabs of the Comet on cloudy nights then this well worth a look.

Jack in Magicland, Jack in Crazyland, Jack and the Pirates. Spectrum 48K, £5.95 each, from; Turtle Software, Bridge Street Mills, Witney, Oxon, OX8 6YH.

Halley's Comet. Spectrum 48K, £8.95 from; Anima Scientific Computing, 33 Lilac Walk, Hebburn, Tyne and Wear NE31 2LT.

Data Creator



Good things come in small packages they say, and Bill McIntosh's useful program proves it!

This program takes code from memory between two specified addresses and creates DATA statements which contain the code in string form using hex notation. Obviously this can save much time and effort, especially in preparing programs for submission to magazines.

The code has been deliberately kept inside string quotes in order to keep the ammount of memory that the statements take up to an absolute minimum.

To use the program, first of all CLEAR RAMTOP to some value below 65000. Type in the HEX loader followed by the DATA lines. When you're happy that all is correct then type RUN and wait until the message 'Out of data' appears. The program code will then have been placed into memory at 65000 and is about 220 bytes long. When you have done this, SAVE the program code with SAVE "DATACREATE" CODE 65000,220.

The start address of the code that you wish to convert should be POKE-ed into 65000 and 65001 and the address of the last byte should be POKE-ed into 65002 and 65003 using the method in Figure 1 as an example.

```
10 LET X = 30000: REM start address
20 POKE 65000,X-256*INT (X/256)
30 POKE 65001,INT (X/256)
40 LET X = 30234: REM end address
50 POKE 65002,X-256*INT (X/256)
60 POKE 65003,INT (X/256)
```

Type and RUN and then NEW. Before running the machine code there must be one program line in BASIC numbered 9999. This can contain anything that you like. It may be of more use though to use 9999 as a REM statement to make notes about the listing. The data line numbers start from some number, depending on the amount of code, increase in single steps, and always end at 9998.

Type in RAND USR 65004. When the operation is complete you will find that the data statements containing your code have been inserted. The listing can now be SAVED or PRINTED in the normal way.

To POKE the code back into memory simply change X in line 5 of the HEX LOADER to the start address of your code and run.

```
   5 LET x=65ØØØ: LET a=1Ø: LET
b=11: LET c=12: LET d=13: LET e=
14: LET f=15
  1Ø READ a$
  2Ø FOR n=1 TO 15 STEP 2
  3Ø LET w=VAL a$(n)
  4Ø LET w=w*16: LET w=w+VAL a$(
n+1)
  5Ø POKE x,w: LET x=x+1
  6Ø NEXT n
  7Ø GO TO 1Ø
  8Ø STOP
9972 DATA "ØØØØØØØØ21ØE2722"
9973 DATA "9FFE2AEAFDED5BE8"
9974 DATA "FDB7ED527DE6Ø728"
9975 DATA "ØE2AEAFD7DE6F86F"
9976 DATA "11Ø8ØØ1922EAFD2A"
9977 DATA "EAFD2B22EAFDED5B"
9978 DATA "E8FDB7ED5222A1FE"
9979 DATA "21BCFE22A5FE3EØ8"
998Ø DATA "32A3FE2AEAFD2B22"
9981 DATA "EAFD237E219EFE77"
9982 DATA "AFED6F47ED6F4FED"
9983 DATA "6F79FEØA38Ø3C6Ø7"
9984 DATA "4F78FEØA38Ø3C6Ø7"
9985 DATA "472AA5FE79C63Ø77"
9986 DATA "2B78C63Ø772B22A5"
9987 DATA "FE21A3FE352ØC421"
9988 DATA "CB5CØ118ØØCB5516"
9989 DATA "2A9FFE2B229FFE23"
999Ø DATA "EB21A7FE7223732B"
9991 DATA "11CB5CØ118ØØEDBØ"
9992 DATA "2AA1FE11Ø8ØØB7ED"
9993 DATA "52D21DFE21C8ØØ11"
9994 DATA "C8ØØCDB5Ø3C9ØØØØ"
9995 DATA "ØØØØØØØØØØØØØØØØ"
9996 DATA "ØØ14ØØE422ØØØØØØ"
9997 DATA "ØØØØØØØØØØØØØØØØ"
9998 DATA "ØØØØØØØØØØ22ØDØØ"
9999 REM START 65ØØØ, END 6522Ø
```

Conversion tips

A guide to ZX81/Spectrum program conversions from David Nowotnik.

The versions of BASIC offered by the two ZX computers are so similar that many programs for one can be used by the other. The ZX81 has only two commands which are not present on the Spectrum, SCROLL and UNPLOT, and these should cause you few problems when converting ZX81 programs to the Spectrum (see Table 1).

There are quite a lot of commands and functions on the Spectrum which are not available on the ZX81. A list of these appears in Table 4. The stars indicate those commands and functions for which there is no simple translation to ZX81 BASIC. Those for colour and sound can be ommitted; but you will have to find some alternative for the high resolution and file I/O commands.

The command PLOT appears on both computers, but the effect is quite different, so beware! Another tip: PEEK and POKE should be used with caution. In conversion, addresses will almost certainly have to be changed. Some of those changes appear in the tables. A command such as POKE USR "a".... on the Spectrum indicates User Defined Graphics; ZX81 users don't have this facility, so you'll have to omit this and use a standard character instead.

ZX81	Spectrum	Comments
SCROLL	RANDOMISE USR 3582 or LET t=USR 3582	If the program uses random numbers, they could become rather predictable with the first option. If so, use the second, using a variable (in this case t) which is otherwise not used.
PLOT Y,X	PRINT AT 21−Y/2,X/2;	Print the appropriate quarter square graphics character.
UNPLOT Y,X	PRINT AT 21−Y/2,X/2;	Print a space, or the appropriate quarter square graphics character.

Table 1 ZX81 to Spectrum conversions.

Spectrum	ZX81	Comments
BIN eg LET y=BIN 10010101	LET y=(decimal no.) Conversion to decimal: 10010101=149 128 64 32 16 8 4 2 1 Add these numbers together when a 1 appears at the appropriate position in binary.	BIN allows the representation of a number in binary. On the ZX81 use the decimal equivalent, but beware; BIN is often used with User Defined Graphics, which are not available on the ZX81.
READ/DATA eg READ x,y DATA 50,60	LET LET X=50 LET Y=60	READ and DATA are used to store a lot of information in a program. Use LET instead.
DEF FN and FN eg DEF a(x)=SQR x LET t=FN a(i)	LET X$="SQR X" LET X=I LET T= VAL X$	The defined function can appear in a string. Use the keyword for built-in functions (eg SQR). The equivalent of FN may need 2 lines, as shown.
PLOT	no equivalent	
SCREEN$ eg LET a=SCREEN$ x,y	LET A=PEEK(PEEK 16396 +256*PEEK 16397+1+Y+33*X)	Used in interactive games to detect characters in the display file. Note — this formula only works when a RAM pack is fitted.

Table 2 Spectrum to ZX81 conversions.

ZX81	Spectrum	Comments
1 FRAMES POKE 16436,255 POKE 16437,255	POKE 23672,0:POKE 23673,0	Both computers have a counter which accurately varies by 50 every second. In the example, use the first line to start the 'clock'. The variable T will have the time in seconds after the start. The counter can only be used for 10 minutes.
LET T=(65535-PEEK 16436-256*PEEK 16437)/50	LET t=(PEEK 23672+256*PEEK 23673)/50 For times greater than 10 minutes, you can use byte 23674 as well.	
2 Line number zero POKE 16510,0	POKE 23756,0 (As the start of BASIC can move, eg with microdrives) use with caution.	Converts the first line of a program to line number zero, which cannot be edited, and so is protected.
3 RAMTOP POKE 16388,X-256*INT (X/256) POKE 16389, INT (X/256)	CLEAR x	Creates a safe area at the top of RAM starting at address x, for storing data, machine code etc.

Table 3 General interconversion hints.

BEEP	*	FORMAT	*	ATTR	*
BORDER	*	INK	*	BIN	
BRIGHT	*	INVERSE		FN	
CAT	*	MERGE	*	IN	*
CIRCLE	*	MOVE	*	OVER	*
CLOSE	*	OPEN	*	POINT	*
DATA		OUT	*	SCREEN$	
DEF FN		PAPER	*	VAL$	*
DRAW	*	READ			
ERASE	*	RESTORE	*		
FLASH	*	VERIFY	*		

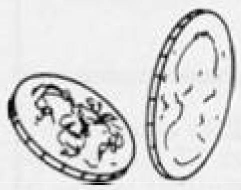
Table 4 Spectrum functions not available on the ZX81.



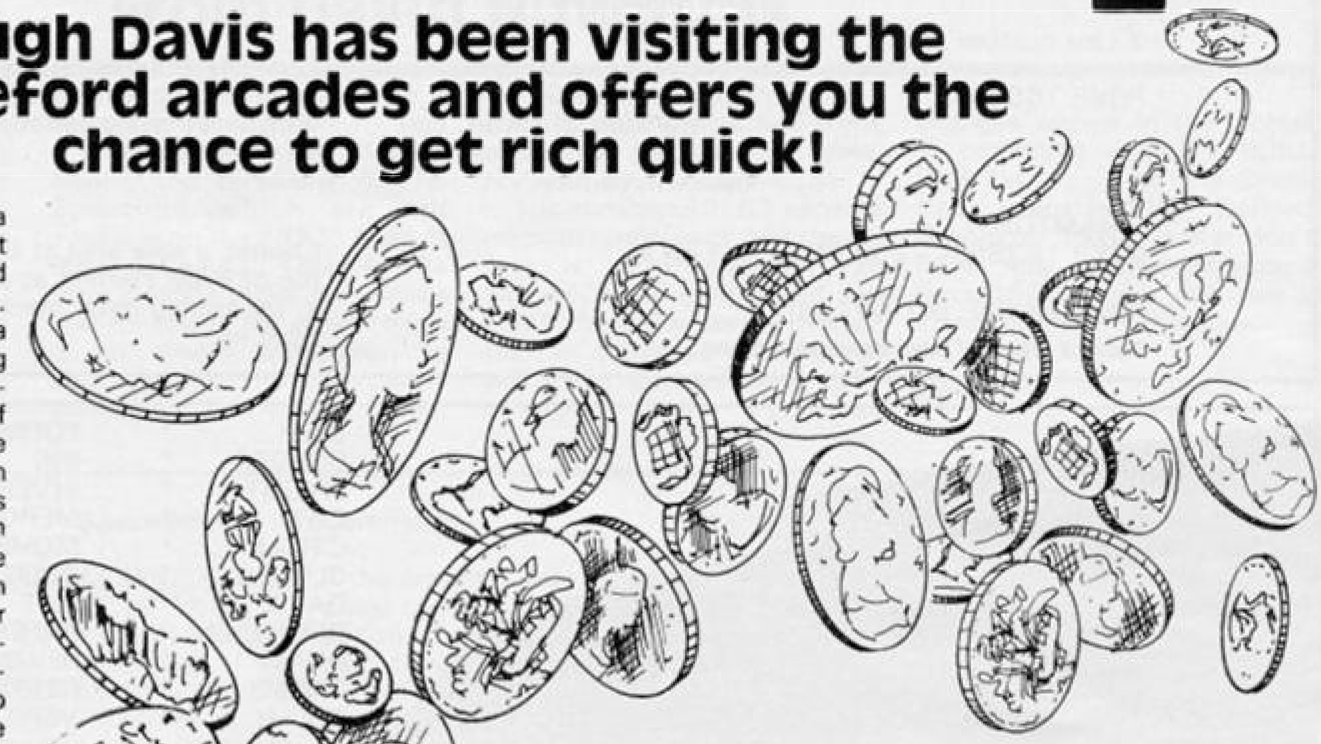
System Variables Conversion Table.

Variable	ZX81/ T/S1000	Spectrum/ TS2068
BREG	16414	23655
CDFLAG	16443	No Equivalent
CH ADD	16406	23645
COORDS	16438	23677
COORDS (Byte 2)	16439	23678
DEST	16402	23629
DF CC	16398	23684
D FILE	16396	No Equivalent
DF SZ	16418	23659
E LINE	16404	23641
ERR NR	16384	23610
E PPC	16294	23625
ERR SP	16386	23613
FLAGS	16385	23611
FLAGX	16429	23665
FRAMES	16436	23672
LAST K	16421	23560
MARGIN	16424	No Equivalent
MEM	16415	23656
MEMBOTT	16477	23698
MODE	16390	23617
NXTLIN	16425	23637
OLDPCC	16427	23662
PPC	16391	23621
PRBUFF	16444	23296
PR CC	16440	23680
RAMTOP	16388	23730
SEED	16434	23670
S PSN	16441	23688
S POSN (Byte 2)	16442	23689
STKBOT	16410	23651
STKEND	16412	23653
S TOP	16419	23660
STRLEN	16430	23666
T-ADDR	16432	23668
VARS	16400	23627
VERSN	16393	No Equivalent
X PTR	16408	23647

Coin Drop



Hugh Davis has been visiting the Hereford arcades and offers you the chance to get rich quick!



The program 'Coin Drop' is a version of the coin-in-the-slot game popular in seaside and fairground amusement arcades. A coin is allowed to fall down a vertical pin-board bouncing from one pin to another in a random path until it reaches one of six coin-bearing channels. The channels contain anything from zero to four coins, and the aim is to bring the total up to five, upon which all five will 'drop' to the player's advantage. Coins won in this way can be retained or reinserted. The result is influenced principally by the decision when to allow the coin to fall during its passage along the top of the board. However, there is the facility to 'nudge' the coin just once in either direction. The fourth channel swallows up all coins and so should be avoided! You have only six coins to start with, and so it is essential to make an early gain.

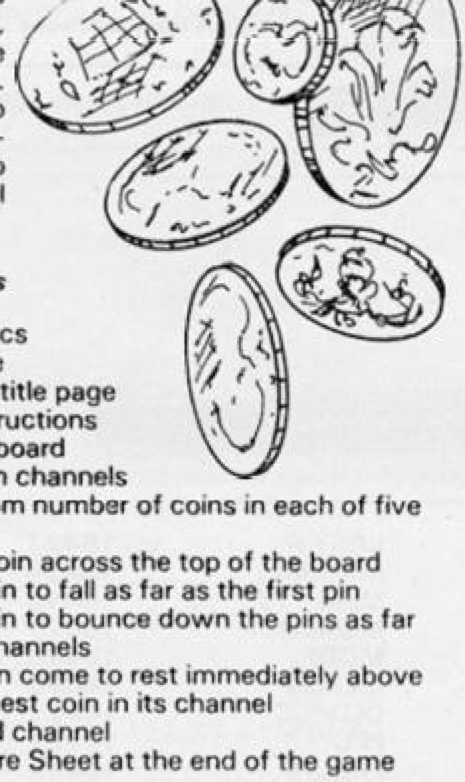


Figure 1.	*Lines*
3000-3050	define graphics
2500-2538	write the title
2540-2580	illustrate the title page
2600-2670	print the instructions
35-65	draw the pinboard
75-85	draw the coin channels
1000-1050	draw a random number of coins in each of five channels
1105-1160	transport a coin across the top of the board
1200-1320	cause the coin to fall as far as the first pin
135-190	cause the coin to bounce down the pins as far as the coin channels
500-560	make the coin come to rest immediately above the next highest coin in its channel
604-615	empty a filled channel
2000-2080	print the Score Sheet at the end of the game

Figure 2.	*Variables*
a$	top half of coin
b$	bottom half of coin
a to f	no. of coins in the channels
g	no. of coins in the channel being topped up
k	decides direction of horizontal motion
m	distance fallen
l	gross loss
w	gross winnings
nw	net winnings in any one game
ow	overall winnings
cr	coins in hand
(x,y)	coin coordinates

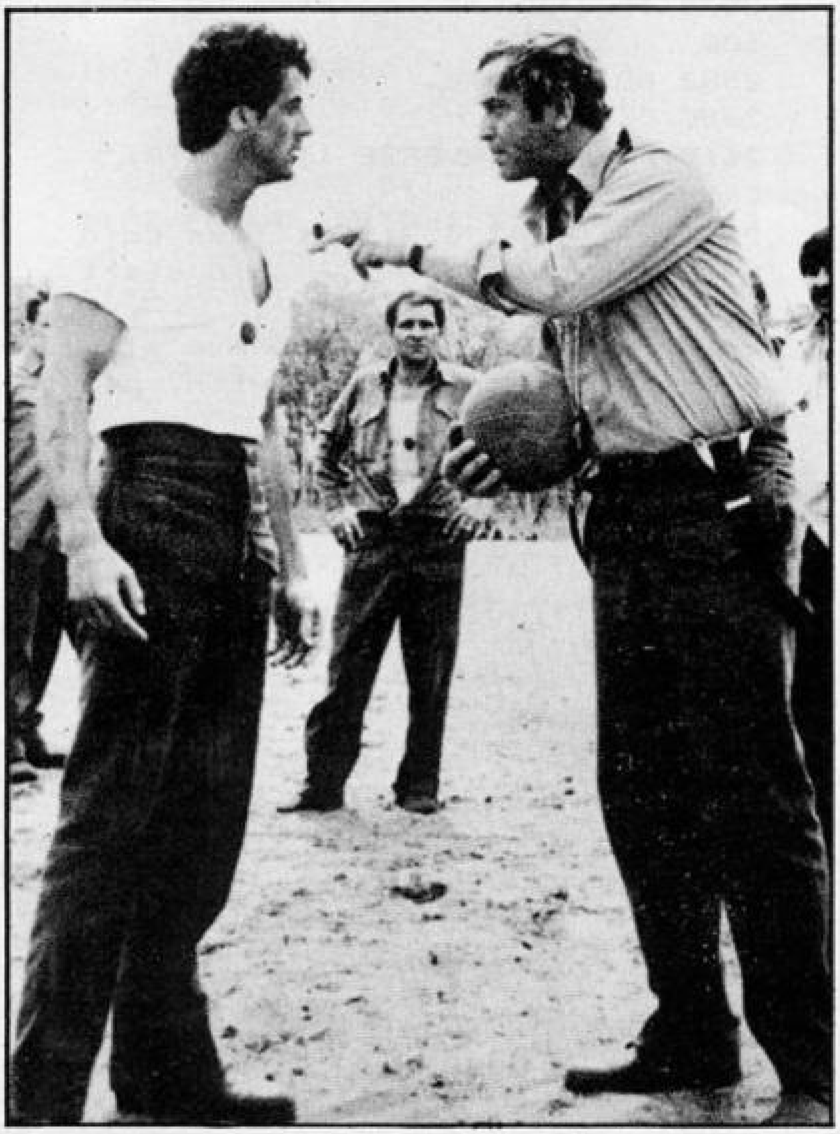
```
   1 REM **********************
         *Underlined characters*
         *are entered in       *
         *GRAPHICS mode.       *
         **********************
   2 GO SUB 3000: BORDER 5: PAPE
R 6: INK 1
   3 LET ow=0
   4 LET a$="AB": LET b$="CD"
  10 GO SUB 2500
  15 CLS
  35 FOR n=0 TO 21: DIM i$(26):
PRINT  PAPER 6;AT n,3;i$: DIM j$
(2): PRINT  PAPER 5;AT n,0;j$;AT
 n,30;j$: NEXT n
  40 FOR n=0 TO 192 STEP 32
  45 CIRCLE 32+n,77,2: BEEP .05,
10: CIRCLE 32+n,109,2: BEEP .05,
20: CIRCLE 32+n,141,2: BEEP .05,
30
  50 NEXT n
  55 FOR n=0 TO 160 STEP 32
  60 CIRCLE 48+n,93,2: BEEP .05,
40: CIRCLE 48+n,125,2: BEEP .05,
20
  65 NEXT n
  70 PAUSE 100
  72 DEF FN t()=INT ((65536*PEEK
 23674+256*PEEK 23673+PEEK 23672
)/50)
  74 LET t1=FN t()
```

```
 75 FOR n=Ø TO 21
 3Ø PRINT  INK 4;AT n,2;"E";AT
n,29;"E"
 85 IF n>12 THEN  PRINT  INK 2;
AT n,3;"EE  EE  EE  EE  EE  EE
EE":  REM GRAPHICS EF
 9Ø NEXT n
 95 PLOT  INK 3;24,159: DRAW  I
NK 3;2Ø7,Ø
 1ØØ LET w=Ø: LET l=Ø
 11Ø PAUSE 1ØØ
 12Ø GO TO 1ØØØ
 13Ø PRINT AT x,y;"  ";AT x+1,y;
"  "
 135 IF INKEY$="a" AND l>4Ø THEN
  LET nw=w-1: GO TO 2ØØØ
 14Ø LET k=2*COS (PI*(INT (RND*2
)))
 15Ø LET x=x+2
 151 IF m=2 AND y<23 AND INKEY$=
"p" THEN  LET y=y+2: GO TO 16Ø
 152 IF m=3 AND y>7 AND INKEY$="
q" THEN  LET y=y-2: GO TO 16Ø
 154 IF k>Ø AND y=27 THEN  LET y
=y-k: GO TO 16Ø
 155 IF k>Ø AND y<26 THEN  LET y
=y+k
 157 IF k<Ø AND y=3 THEN  LET y=
y-k: GO TO 16Ø
 158 IF k<Ø AND y>4 THEN  LET y=
y+k
 16Ø PRINT  INK 1;AT x,y;a$;AT x
+1,y;b$
 165 BEEP .Ø5,2Ø
 166 FOR n=1 TO 1ØØ: NEXT n
 17Ø LET m=m+1
 18Ø IF m=6 THEN  GO TO 5ØØ
 19Ø GO TO 13Ø
 5ØØ IF y=5 THEN  LET g=a: LET a
=a+1: GO TO 53Ø
 5Ø5 IF y=9 THEN  LET g=b: LET b
=b+1: GO TO 53Ø
 51Ø IF y=13 THEN  LET g=c: LET
c=c+1: GO TO 53Ø
 515 IF y=17 THEN  LET g=Ø: GO T
O 53Ø
 52Ø IF y=21 THEN  LET g=e: LET
e=e+1: GO TO 53Ø
 525 IF y=25 THEN  LET g=f: LET
f=f+1
 53Ø IF g=4 THEN  GO TO 6ØØ
 54Ø FOR n=Ø TO 3-g: PRINT  INK
1;AT 12+2*n,y;"  ";AT 13+2*n,y;"
  ";AT 14+2*n,y;a$;AT 15+2*n,y;b
$
 55Ø PAUSE 2Ø
 56Ø NEXT n
 565 IF y=17 THEN  PRINT AT 2Ø,1
7;"  ";AT 21,17;"  ": BEEP 1,Ø
 568 IF cr<=Ø THEN  GO TO 2ØØØ
 57Ø PRINT  INK 2; FLASH 1;AT 1,
2Ø;" Press L "
 575 IF INKEY$="l" THEN  PRINT
INK 2; FLASH 1;AT 1,27;"M": GO T
O 11ØØ
 576 LET t=FN t(): IF t>t1+24Ø T
HEN  GO TO 199Ø
 578 IF INKEY$="a" AND l>4Ø THEN
  LET nw=w-1: GO TO 2ØØØ
 58Ø GO TO 575
 6ØØ BEEP 1,4Ø
 6Ø4 FOR n=Ø TO 4
 6Ø6 LET w=w+1Ø: LET nw=w-1: LET
 cr=nw+6Ø
 6Ø8 PRINT AT 12+2*n,y;"  ";AT 1
3+2*n,y;"  ": BEEP .1,3Ø: PAUSE
2Ø
 61Ø PRINT AT Ø,15;"    "
 612 PRINT  BRIGHT 1; FLASH 1;AT
Ø,15;cr
 615 NEXT n
 618 IF cr<=Ø THEN  GO TO 2ØØØ
 62Ø IF y=5 THEN  LET a=Ø
 621 IF y=9 THEN  LET b=Ø
 622 IF y=13 THEN  LET c=Ø
 624 IF y=21 THEN  LET e=Ø
 625 IF y=25 THEN  LET f=Ø
 63Ø PRINT  INK 2; FLASH 1;AT 1,
2Ø;" Press L "
 635 IF INKEY$="l" THEN  PRINT
INK 2; FLASH 1;AT 1,27;"M": GO T
O 11ØØ
 638 IF INKEY$="a" AND l>4Ø THEN
  GO TO 2ØØØ
 64Ø GO TO 635
1ØØØ LET a=INT (RND*3): FOR n=1
TO a: IF a<>Ø THEN  PRINT  INK 1
;AT 23-2*n,5;b$;AT 22-2*n,5;a$:
BEEP .Ø5,Ø: NEXT n
1Ø1Ø LET b=INT (RND*3): FOR n=1
TO b: IF b<>Ø THEN  PRINT  INK 1
;AT 23-2*n,9;b$;AT 22-2*n,9;a$:
BEEP .Ø5,1Ø: NEXT n
1Ø2Ø LET c=INT (RND*5): FOR n=1
TO c: IF c<>Ø THEN  PRINT  INK 1
;AT 23-2*n,13;b$;AT 22-2*n,13;a$
: BEEP .Ø5,2Ø: NEXT n
1Ø4Ø LET e=INT (RND*5): FOR n=1
TO e: IF e<>Ø THEN  PRINT  INK 1
;AT 23-2*n,21;b$;AT 22-2*n,21;a$
: BEEP .Ø5,3Ø: NEXT n
1Ø5Ø LET f=INT (RND*3): FOR n=1
TO f: IF f<>Ø THEN  PRINT  INK 1
;AT 23-2*n,25;b$;AT 22-2*n,25;a$
```

```
: BEEP .05,40: NEXT n
1060 PRINT  INK 2; FLASH 1;AT 1,
20;" Press L "
1065 IF INKEY$="l" THEN  PRINT
INK 2; FLASH 1;AT 1,27;"M": GO T
O 1100
1068 IF INKEY$="a" AND l>40 THEN
  GO TO 2000
1070 GO TO 1065
1100 LET l=l+10: LET nw=w-1: LET
 cr=nw+60
1101 PRINT AT 0,15;"    "
1102 PRINT  BRIGHT 1; FLASH 1;AT
 0,15;cr
1104 PRINT  INK 1;AT 0,3;a$;AT 1
,3;b$: PAUSE 6
1105 FOR n=3 TO 27
1110 PRINT AT 0,n;"  ";AT 1,n;"
 "
1115 IF n=27 AND cr<=0 THEN  GO
TO 2000
1120 IF n=27 THEN  GO TO 1060
1130 PRINT  INK 1;AT 0,n+1;a$;AT
 1,n+1;b$
1140 PAUSE 6
1150 IF INKEY$="m" AND INT (n/2)
<>INT ((n-1)/2) THEN  LET y=n+1:
 PRINT AT 1,20;"          ": GO T
O 1200
1160 NEXT n
1200 LET x=0: LET m=0
1210 PRINT AT x,y;"  ";AT x+1,y;
"  "
1212 PRINT AT 0,15;"    "
1215 PRINT  BRIGHT 1; FLASH 1;AT
 0,15;cr
1220 LET x=x+2: LET m=m+1
1230 PRINT  INK 1;AT x,y;a$;AT x
+1,y;b$
1240 BEEP .05,20: FOR n=1 TO 50:
 NEXT n
1250 IF INT ((y+1)/4)=INT ((y+3)
/4) THEN  GO TO 1300
1260 IF m=2 THEN  GO TO 1300
1270 GO TO 1210
1300 PRINT AT x,y;"  ";AT x+1,y;
"  "
1310 PLOT  INK 3;24,159: DRAW  I
NK 3;207,0
1320 GO TO 135
1990 PRINT AT 0,15;"    ";AT 1,2
0;"          "
1992 PRINT  INK 1; FLASH 1;AT 1,
8;" ARCADE CLOSING "
1994 FOR n=0 TO 400: NEXT n
2000 PRINT AT 0,15;"    ";AT 1,2
0;"          "
2002 LET ow=ow+nw
2003 IF ow>=0 AND INT ((ow-10)/1
00)=INT (ow/100) THEN  PRINT  IN
K 7; PAPER 1; FLASH 1;AT 1,4;" W
INNINGS SO FAR #";AT 1,22;ow/10
0;"0 "
2004 IF ow>=0 AND INT ((ow-10)/1
00)<>INT (ow/100) THEN  PRINT  I
NK 7; PAPER 1; FLASH 1;;AT 1,4;"
 WINNINGS SO FAR #";AT 1,22;ow/
100;".0"
2006 IF ow<0 AND INT ((ow-10)/10
0)=INT (ow/100) THEN  PRINT  INK
 7; PAPER 1; FLASH 1;AT 1,7;" LO
SS SO FAR #";AT 1,21;-ow/100;"0
 "
2007 IF ow<0 AND INT ((ow-10)/10
0)<>INT (ow/100) THEN  PRINT  IN
K 7; PAPER 1; FLASH 1;AT 1,7;" L
OSS SO FAR #";AT 1,21;-ow/100;"
.0 "
2009 FOR n=0 TO 8
2010 DIM i$(26)
2020 PRINT  PAPER 2; BRIGHT 1;AT
 13+n,3;i$
2030 NEXT n
2040 PRINT  INK 7; PAPER 2;AT 14
,4;"You have just spent "; FLASH
 1; BRIGHT 1;AT 14,24;l;"p"
2050 PRINT  INK 7; PAPER 2;AT 16
,7;"and have won "; FLASH 1; BRI
GHT 1;AT 16,20;w;"p"
2060 IF nw>=0 THEN  PRINT  INK 7
; PAPER 2;AT 18,5;"Your net gain
 is "; INK 7; PAPER 0; FLASH 1;
BRIGHT 1;AT 18,22;nw;"p"
2070 IF nw<0 THEN  PRINT  INK 7;
 PAPER 2;AT 18,5;"Your net loss
is "; INK 7; PAPER 0; FLASH 1; B
RIGHT 1;AT 18,22;-nw;"p"
2080 PRINT  INK 7; PAPER 1; FLAS
H 1; BRIGHT 1;AT 20,4;" Press P
to play again "
2082 IF t>t1+240 AND INKEY$="p"
THEN  LET t1=FN t(): LET ow=0: G
O TO 2100
2085 IF INKEY$="p" THEN  GO TO 2
100
2090 GO TO 2040
2100 PRINT AT 1,3;"
            "
2105 FOR n=0 TO 8
2110 DIM i$(26)
2120 PRINT  PAPER 6;AT 13+n,3;i$
2130 NEXT n
2140 GO TO 75
2500 DIM i$(704): PRINT AT 0,0;i
```

```
$
2520 PLOT 26,144: DRAW Ø,-32,11*
PI/1Ø: BEEP .Ø5,1Ø
2523 PAUSE 3Ø
2524 PLOT 32,112: DRAW 12,32: BE
EP .Ø5,1Ø: DRAW 12,-32: BEEP .Ø5
,1Ø: PLOT 35,12Ø: DRAW 18,Ø: BEE
P .Ø5,1Ø
2526 PLOT 8Ø,136: DRAW -8,-8,3*P
I/2: BEEP .Ø5,1Ø: PLOT 64,12Ø: D
RAW 8,8,3*PI/2: BEEP .Ø5,1Ø
2527 PAUSE 3Ø
2528 PLOT 88,112: DRAW Ø,32: BEE
P .Ø5,1Ø: PLOT 1Ø4,112: DRAW Ø,3
2: BEEP .Ø5,1Ø: PLOT 88,128: DRA
W 16,Ø: BEEP .Ø5,1Ø
2529 PAUSE 3Ø
253Ø PLOT 116,128: DRAW 8,Ø: BEE
P .Ø5,1Ø
2531 PAUSE 3Ø
2532 PLOT 136,112: DRAW Ø,32: BE
EP .Ø5,1Ø: DRAW 16,Ø: BEEP .Ø5,1
Ø: PLOT 136,128: DRAW 1Ø,Ø: BEEP
 .Ø5,1Ø
2533 PAUSE 3Ø
2534 PLOT 176,112: DRAW -16,Ø: B
EEP .Ø5,1Ø: DRAW Ø,32: BEEP .Ø5,
1Ø
2535 PAUSE 3Ø
2536 PLOT 194,144: DRAW Ø,-32,5*
PI/6: BEEP .Ø5,1Ø: DRAW Ø,32,5*P
I/6: BEEP .Ø5,1Ø
2537 PAUSE 3Ø
2538 PLOT 214,144: DRAW 8,-32: B
EEP .Ø5,1Ø: DRAW 8,16: BEEP .Ø5,
1Ø: DRAW 8,-16: BEEP .Ø5,1Ø: DRA
W 8,32: BEEP .Ø5,1Ø
254Ø FOR n=13 TO 21
2545 PRINT  INK 2;AT n,3;"EE  EE
  EE  EE  EE  EE  EE"
255Ø PRINT  INK 4;AT n,2;"E";AT
n,29;"E"
2555 NEXT n
2558 LET q=5
256Ø FOR n=Ø TO 3: PRINT  INK 1;
AT 12+2*n,q;"  ";AT 13+2*n,q;"
";AT 14+2*n,q;a$;AT 15+2*n,q;b$:
 BEEP .Ø5,q: NEXT n
2561 FOR n=Ø TO 2: PRINT  INK 1;
AT 12+2*n,q;"  ";AT 13+2*n,q;"
";AT 14+2*n,q;a$;AT 15+2*n,q;b$:
 BEEP .Ø5,q: NEXT n
2562 FOR n=Ø TO 1: PRINT  INK 1;
AT 12+2*n,q;"  ";AT 13+2*n,q;"
";AT 14+2*n,q;a$;AT 15+2*n,q;b$:
 BEEP .Ø5,q: NEXT n
2563 PRINT  INK 1;AT 14,q;a$;AT
15,q;b$: BEEP .Ø5,q
2565 LET q=q+4: IF q<29 THEN  GO
 TO 256Ø
257Ø IF q=29 THEN  PRINT  FLASH
1; BRIGHT 1; INK 1;AT 1Ø,2;" PRE
SS <I> FOR INSTRUCTIONS "
2575 IF INKEY$="i" THEN  GO TO 2
6ØØ
258Ø GO TO 257Ø
26ØØ CLS
261Ø PRINT  INVERSE 1;AT 1,1Ø;"
CASH-FLOW "
2615 PRINT AT 3,2;"Get five coin
s in one column          to start
 the flow."
262Ø PRINT AT 6,3;"You have six
1Øp pieces to      play with, plu
s any winnings"
2622 FOR n=Ø TO 4ØØ: NEXT n
2625 PRINT  INK 6; PAPER 2;AT 1Ø
,1;" CONTROLS "
263Ø PRINT AT 1Ø,13;"L inserts c
oin";AT 11,13;"M lets it fall"
2635 PRINT AT 13,3;"P and Q nudg
e the coin to        right or lef
t (once only)"
264Ø PRINT AT 17,2;"<A> enables
you to abandon        a game with
 your winnings             after sp
ending 5Øp"
2642 FOR n=Ø TO 4ØØ: NEXT n
2644 DIM i$(16Ø): PRINT  PAPER 6
;AT 3,Ø;i$
2646 PRINT  INK 1; FLASH 1;AT 5,
2;" ARCADE CLOSES IN 4 MINUTES "
2648 FOR n=Ø TO 4ØØ: NEXT n
265Ø PRINT AT 5,2;"
                  "; INK 3; FLASH 1
;AT 5,7;" PRESS Z TO PLAY "
266Ø IF INKEY$="z" THEN  RETURN
267Ø GO TO 266Ø
3ØØØ RESTORE : LET n=Ø
3Ø1Ø LET u=PEEK 23675+256*PEEK 2
3676
3Ø2Ø READ j: IF j=.5 THEN  RETUR
N
3Ø3Ø POKE u+n,j: LET n=n+1: GO T
O 3Ø2Ø
3Ø4Ø DATA 7,31,63,112,119,228,23
9,231, 224,248,252,14,23Ø,247,24
7,247, 231,224,231,97,112,63,31,
7, 247,247,231,198,14,252,248,22
4
3Ø5Ø DATA 127,127,127,127,127,12
7,127,127, 254,254,254,254,254,2
54,254,254, .5
9Ø2Ø SAVE "cash-flow" LINE 1
```

Problem Page



This issue I had an offer I couldn't refuse, Ray the Ed asked me to give some advice on how GRANDSTAND, which we published a couple of months back for the ZX80, could be converted for the Spectrum. Apparently he has been inundated with pleas for help!

Data

The first thing is that DATA is simulated in lines 1 to 7, so change lines 1 to 7 to DATA lines so that each follows the format:

1 DATA "LIVERPOOL", "MAN. UTD.", "NOTTM. F.", "Q.P.R.", and so on

until all the names are entered. There is no need to be precise with each name being nine characters long, but a maximum length of nine characters is wise.

The main use of this Data is made in lines 22 to 38, so remove all these lines and replace them with

```
22 RESTORE A
23 FOR c=1 TO B: READ o$:
   NEXT c
24 FOR c=1 TO LEN o$
25 PRINT o$(c);: PAUSE 25
26 NEXT c
28 RETURN
```

Briefly, the subroutine at line 31 does the same as the RESTORE (now in line 22). Line 23 reads the Data until the required name is in o$ and the loop from 24 to 26 prints out each letter of the name. PAUSE 25 causes a slight delay to imitate the TV teletype style printing.

Lines 9952 and 9955 need to be changed to RESTORE A to allow for the removal of the subroutine at 31. If you find any GOSUB 30 lines which I've missed then don't forget to change them yourself to RESTORE A.

The random number routine is different in the ZX80 and ALL occurences of RND(number) should be replaced by:

INT (RND * number + 1)

So the line 120 should read:

120 LET c(a) = INT (RND * 10 + 1) + 10

Save

The save routine is pretty straightforward, but I would change it to 1550 SAVE "grandstand" LINE 1010, and Line 1560 to GO TO 1010.

The PEEK 16421 in Line 3490 is a way of checking for a full screen. The Spectrum does not need this line as it will offer a scroll when the screen is full. Therefore leave out Line 3490. However it appears again in Line 8342 where its purpose is different, so to get the same result change the 16421 to the Spectrum address 23689, (this can also be done in line 3490 if you wish), also the same appears in line 8515 and 8516.

The lines from 9960 to 9988 print the title screen. Replace all these with artwork of your own or, if you do not want to go to the trouble, simply omit them except for 9988 RETURN. Leave this last line in because at some points the program will jump to this routine and it is best to keep it in case you fail to find all the GO SUB 9960 statements. I would put some simple title in anyway, even if it is only to PRINT the name of the game.

Now for the hardest bit of all; lines 9952 to 9959 deal with movement of teams by poking information around the REMs. We have to find another way, so perhaps it is worth going back to standard principles, and writing the program in a more structured way. Add lines:

```
9019 DIM O$(149,9): REM 1
counted 149 data items.
9020 RESTORE: FOR i=1 TO
149
9021 READ o$(i): NEXT i
```

Now all the Data is held in the elements of array o$( ) and so lines 22 to 28 can be further modified to:

```
22 GO SUB 26
23 FOR c=1 TO 9
24 PRINT o$(B+X,c);: PAUSE
25
25 NEXT c
26 LET X=VAL "000022044
068092124125" (((A-1) *
3+1) TO ((A-1) * 3+3))
27 RETURN
```

Apart from Line 22, which gosubs to 26 to get the position in o$( ) that the name now occupies and then returns to the same routine (recursive), the lines are straightforward.

Making the transfers also becomes simple, replace lines 9952 to 9959 with:

```
9952 GO SUB 26: LET AA=X
9953 LET A=C: GO SUB 26
9954 LET o$(D+X)=o$
(B+AA)
9956 LET o$(B+AA)=v$
9957 RETURN
```

Now, the reason we had the funny recursive positioning of line 26 becomes clear, we can use it from this routine to determine the X value. Once the two positions of the teams have been determined then they are swapped.

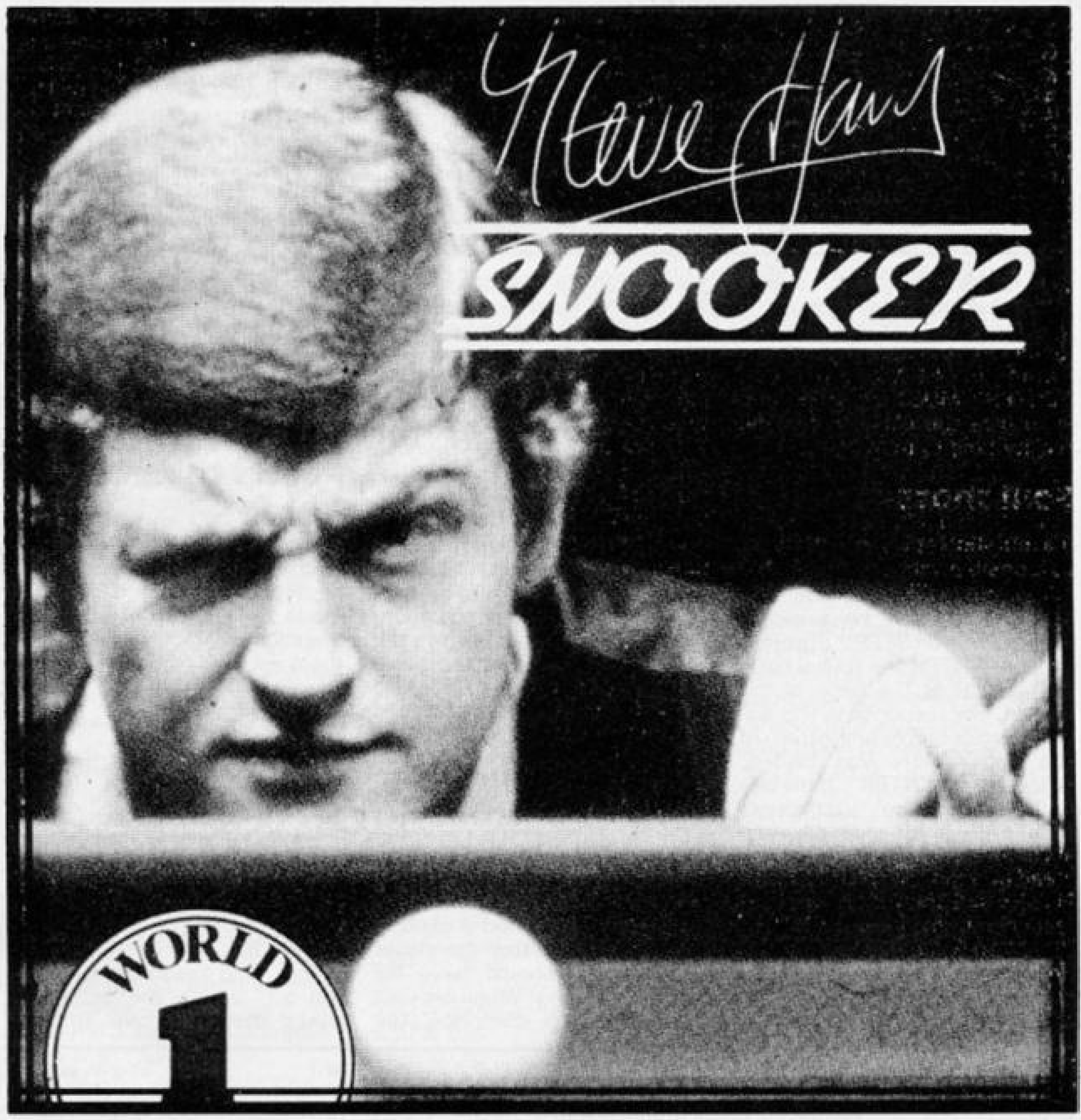
Finally, I have written this as I developed the conversions deliberately in an attempt to demonstrate how a problem may be solved and then resolved as a conversion progresses. Structured programming is great, providing you have all the functions you require available. The ZX80 and 81 do not have data capabilities and the ways of emulating it are many and varied, this was a clever but fairly straightforward method.

Of course, there are other ways, looking at it in retrospect I would probably use a three dimensional array DIM o$(32,7,9) and read each of the seven REM/DATA separately, then the awkward Line 26 couldbe left out as the 'A' value becomes the second element — ie. Line 24 would become PRINT o$(B,A,c) and lines 22 and 26 would be redundant. Many lines could also be compressed into multi-line statements, and by using the DEF FN function several of the calculations could be speeded up and performed more efficiently.

I hope this has given you all some ideas, personally I find converting programs second only to creating an original for giving satisfaction, and as always, if you have a problem drop me a line, and I'll do my best to help. ■

Snooker Scoreboard

If you are a budding Steve Davis, this program from Dungannon's Brian Buckley will straighten your cue.



When playing Snooker the most tedious part is keeping track of the score. Not being an expert, I also have difficulty in remembering the value of each colour! Frequently my family spend more time discussing the accuracy of the scores than actually playing, so when this program arrived I found it very valuable indeed. Now here it is for you to share the benefits of an accurate and impartial referee.

Having typed the program into the machine, SAVE it with SAVE "SNOOKSCORE" LINE 30. This will ensure that the program automatically RUNs when subsequently LOADed from tape. All DATA should be checked for errors. After responding to all of the prompts at the start of the program, there will be a short pause (about two seconds) as all the UDG's are set up. You will then see a snooker table being drawn on the screen, followed by the scoreboard itself. This is the main display. I shall now describe the various features of the program.

Score correction

Pressing the "−" key, (SYMBOL SHIFT and "J" pressed together), brings the score correction facility into operation. This allows corrections to be made to either player's score. When called, two short BEEPs will be heard, and a prompt "Please ENTER ball to be deleted" will appear at the base of the screen. The response to the prompt will be the incorrect ball. For example, if you accidentally add the blue ball to your score instead of a red. You would press "−" to use the correction routine, and in response to the prompt, ENTER "E". The prompt will then disappear and the value of the blue ball will be removed from your score. You will notice that "Last Shot" has changed to "error", to remind you that the corrected ball has ▶

Control keys.

1 —	Changes FLASHing of one player's name to the other.
0 —	When pressed at the end of a frame, resets break and points to 0, and increases the appropriate frame score by 1.
R —	Adds value of Red ball to score of player whose name is FLASHing.
Y —	Adds value of Yellow ball.
G —	Adds value of Green ball.
N —	Adds value of Brown ball.
E —	Adds value of Blue ball.
P —	Adds value of Pink ball.
K —	Adds value of Black ball.
F —	Brings Foul shot subroutine into operation.
— —	Brings score correction subroutine into operation.

yet to be input. You should remember that when correcting a score, the points will be deducted from the player whose name is FLASHing, and "ENTER" MUST be used. This is to give the player using the facility time to think.

Foul shots

If a foul shot is played, the player responsible should have his name set to FLASH. The "F" key should then be pressed. After two short BEEPs, a prompt "Please ENTER the fouled ball" will appear at the base of the screen. The response to this will be the colour (only one letter!) of the ball which was fouled, followed by "ENTER". If the cue ball was potted, just press "ENTER". If for example, you accidentally pot the black ball instead of a red, set your name to FLASH and then press "F". In response to the prompt, ENTER "K". You will then see your opponent's score increase by seven points and your "Last shot" change to "foul". When you are familiar with the ENTERing system used in this part of the program, you can just press "ENTER" when the value of the foul shot is four points (after calling the routine of course), as it is when you miss a red, or accidentally pot a coloured ball whose value is worth up to and including four points. If a foul shot is played and the points for it given to the wrong player (pressing "F" when the innocent player's name was FLASHing, instead of the guilty player's name), just change the FLASH and carry out the score correction procedure, removing the value of the foul, and then the procedure for foul shots, given above.

Break

The program will display each player's break throughout the match, but this will be correct is the following method is used.

It is essential that the player at the table should have his name FLASHing. When his visit to the table is complete, the FLASH should be changed to the other player. The following example will illustrate why.

During his visit to the table, player 1 pots a red ball, followed by the black. His break is now eight points. He returns to his seat after missing the next red (failing to pot it), with his break still eight points. Player 2 comes to the table. The scoreboard now shows his name FLASHing. He attempts to pot a red ball but fails, returning to his seat. Player 1 then comes to the table again, and the scoreboard changes so that his name FLASHes. As the FLASH changes back to player 1's name, his previous break is reset to 0. If the FLASH had not been changed to player 2 when he was playing (even though he didn't score anything), it means that anything that player 1 scores this time will be added onto his previous break, thus making the break incorrect.

Points to note

In lines 1180 and 1200, the capital letters contained in double quotation marks should be typed in using GRAPHICS mode as they are user defined graphics characters. A list of them appears below:

"A"
"B"
"C"
"D"
"E"
"F"



In line 160, s$ contains seven spaces, and following a, b, b1 and b2, within the quotation marks there are two spaces. After c and d there is only one space in quotation marks. These numbers are the same throughout the listing.

In line 180, the quotation marks after s$ contain two spaces.

In line 380, the first set of quotation marks contain 20 spaces, and the second, 32.

In line 540, 32 spaces are contained in the quotation marks.

Line 580 also has 32 spaces within quotation marks.

In line 680, within the same quotation marks as "MATCH OVER", four spaces are contained before and after the words.

In line 690, two spaces are inserted before and after the word in quotation marks.

In line 700, the string after "MATCH INFORMATION" consists of 17 CHR$ 131's.

Line 710 has 32 CHR$ 131's in quotation marks.

In 720, within the quotation marks, there are five spaces before and after the words.

Line 1170 has 32 CHR$ 143's within its quotation marks.

In the first quotation marks in line 1180, there is one CHR$ 143 and A. In the second set, 14 CHR$ 143's. In set three, B, while in set four 13 CHR$ 143's. Finally, in set five, C and 1 CHR$ 143 are contained.

In the long string in line 1190, there are 30 CHR$ 143's. Line 1200 is almost the same as line 1180. The differences are in sets 1, 3, and 5, where the graphics characters are D, E, and F. Line 1210 has 32 CHR$ 143's in quotation marks.

Figure 2. Variables.

a	Player 1's score during a frame.
b	Player 2's score during a frame.
c	Player 1's overall frame score.
d	Player 2's overall frame score.
e	Value of blue ball.
f	Value of a Foul shot.
g	Value of Green ball.
k	Value of black ball.
l	Number of frames over which match is being played.
n	Value of brown ball.
p	Value of Pink ball.
r	Value of Red ball.
s	LEN a$.
t	X-position of Player 1's name.
u	LEN b$.
v	X-position of Player 2's name.
w	a minus b.
x	b minus a.
y	Value of Yellow ball.
z	Current frame.
a( )	Stores player 1's frame scores throughout the match.
b( )	Scores player 2's frame scored throughout the match.
b1	Player 1's break.
b2	Player 2's break.
s1	X-position of Player 1's scores.
s2	X-position of Player 2's scores.
p1-p6	DATA for pockets for main display.
hi	Highest break of match.
hif	Frame in which highest break was obtained.
a$	Player 1's name.
b$	Player 2's name.
c$	Holds INKEY$.
f$	INPUT for a foul shot.
h$	Holds name of player with highest break.
m$	Holds name of winner of each frame.
s$	Last shot.
v$	INPUT for score correction.
w$	"point." or "points.", depending on score difference.
x$	"Frame." or "Frames.", depending on l.
z$	"leads by".

Figure 3. Line description.

LINE NUMBER	*LINE FUNCTION*
30	Sets screen colours and BEEPS upon LOADing from tape.
40	Sets "L" cursor, PRINTs title and asks if instructions are required.
60	Assigns pressed key to y$. If y$ is "y", control is sent to 860 for instructions to be PRINTed.
70	Resets screen colours upon returning from instructions.
80	READs values from the DATA statement in line 90 and sets these variables.
100	Sets "C" cursor and activates keyboard BEEP. Requests Player 1's name to be ENTERed.
110	Requests Player 2's name to be ENTERed.
120	Requests the number of frames over which the match is to be played to be ENTERed, and sets x$.
130	PRINTs a thank-you message, switches keyboard BEEP off, sets "L" cursor and sends control to subroutine at 1110 which PRINTs a snooker table on screen. Main screen is then PRINTed on the table.
140	Reserves space for unscripted variables a and b. These are used to hold the scores at the end of each frame.
150	Start of main loop.
160	Sets various scores to 0 and then PRINTs these on screen.
170	Sets Player 1's break to 0.
180	FLASHes Player 1's name and PRINTs all of his scores.
190	Checks c$ for "—", and if found brings score correction routines into operation.
200	As in 190, but checks for "f" and deals with foul shots.
210	Sets s$ to " " and sends control to 260 if c$ is "1".
220	If c$ is "0" (end of frame) and a b, sends control to 350.
240	Updates Player 1's points score and break. Checks tp see of the break = the highest break and if so, makes h$ = a$ and hif = the current frame (z). Also males hi = b1.
260	Sets Player 2's break to 0.
270	FLASHes Player 2's name and PRINTs all of his scores.
280	Checks of c$ is "—", and if so, sends control to score correction routines.
290	Checks if c$ os "f", and if so, sends control to subroutine dealing with foul shots.
300	If c$ is "1", sets s$ to " " and sends control to 170.
310	Sends control to 350 if c$ is "0" and b a.
330	Updates Player 2's points score and break. Checks to see if the break = the highest break and if so, makes h$ = b$ amd hif = z. Also makes hi = b2.
350	If a b, Player 1's frame score (c) is increased by 1, and a$ is assigned to m$.
360	If b a, Player 2's frame score (d) is increased by 1, and b$ is assigned to m$.
370	Each Player's final score in a frame is assigned to the subscripted variables a and b. A check is made to see of a winner exists, and if so, control is sent to 670.
380	Plays a short tune at the end of a frame and blanks out the last shot for each player. Also blanks out the lead line.
390	Increases current frame by 1. Sends control back to the start of the main loop.
400 & 410	Check for keypresses.
420	Assigns any pressed key to string variable c$.
430	Crashproofing: checks for valid keys being pressed. If an invalid key is pressed, a BEEP is issued and control sent back to the start of the subroutines at line 400.
450-590	450-430 assign certain strings to s$ depending on c$. 540-580 update lead line and calculate the x-position so as to keep it centralised on screen.
600	Requests input for a foul shot and checks entry is valid. If not, then control is sent back to the start of the line.
610	If f$ (input in above line) is one of five certain strings, then f$ is set to "4".
630	Deals with a foul shot against Player 2 by adding the relevant amount of his score and PRINTing it on screen.
640	As 630, but for Player 1.
650	Requests input for score correction and checks input for validity. If an invalid input is detected, control is sent back to the start of the line.
670	BEEPs and flashes BORDER with various colours at the end of the match.
680	Resets scores to 0 and PRINTs final screen.
700	PRINTs information about highest break etc.
710	PRINTS all frame scores for each player.
720	Gives instructions for using program again.
730	Assigns INKEY$ to z$. If z$ is "y", program is RUN again.
740	Erases program from memory as it is no longer required. RANDOMIZE USR 0 was used as NEW did not remove UDG's.
750 & 760	Scan keyboard for pressed keys.
780	Calculates x-position of Player 1's name and scores.
790	Calculates x-position of Player 2's name and scores.
800 & 810	Prevent a and b1 becoming negative.
830 & 840	Prevent b and b2 becoming negative.
860-1030	Instructions.
1040	PRINTs instructions about seeing instructions again.
1060	Assigns INKEY$ to z$. If z$ is "y", then instructions are PRINTed again by sending control to line 860.
1110-1160	Sets up UDG's for pockets.
1170-1210	Draws table.
1220-1260	DRAWs lines on table.
1280-1330	DATA for UDG's.

```
   1 REM **********************
         *Underlined characters*
         *are entered in       *
         *GRAPHICS mode.       *
         **********************
  30 CLS : BORDER 4: PAPER 4: IN
K Ø: CLS : BEEP .1,1Ø: BEEP .1,1
5
  4Ø POKE 23658,Ø: PRINT AT 5,7;
"Snooker Scoreboard";AT 7,8; B
rian  Buckley": PAUSE 75: PRINT
AT 11,1;"Do you want instruction
s (y/n)?"
  5Ø GO SUB 75Ø
  6Ø LET y$=INKEY$: IF y$="y" TH
EN  GO TO 86Ø
  7Ø BORDER 4: PAPER 4: INK Ø: C
LS
  75 REM 8Ø & 9Ø BALL VALUES ETC
  8Ø READ z,c,d,r,y,g,n,e,p,k,f,
```

```
x,w,hi
  9Ø DATA 1,Ø,Ø,1,2,3,4,5,6,7,4,
Ø,Ø,Ø
 1ØØ BEEP .1,2Ø: POKE 23658,8: P
OKE 23609,75: CLS : PRINT AT Ø,Ø
;"Please:-";AT 5,Ø;"Enter player
 1's first name": INPUT a$: GO S
UB 78Ø
 11Ø PRINT AT 8,Ø;"Enter player
2's first name": INPUT b$: GO SU
B 79Ø
 12Ø LET x$=" Frames. ": PRINT A
T 11,Ø;"Enter the number of fram
es over"'"which the match is to
be played": INPUT l: IF l<2 THEN
  LET x$=" Frame.  ": IF l<=Ø TH
EN  BEEP .5,-5: GO TO 12Ø

 125 REM 13Ø SETS UP MAIN SCREEN

 13Ø PRINT AT 15,1Ø;"Thank-you":
 PAUSE 5Ø: CLS : POKE 23609,Ø: P
OKE 23658,Ø: CLS : GO SUB 111Ø:
PRINT  INVERSE 1; BRIGHT 1;AT Ø,
3;"Over ";l;x$;TAB 2Ø;"Frame:";z
; INVERSE Ø; BRIGHT Ø; FLASH 1;A
T 3,t;a$; FLASH Ø;AT 3,v;b$;AT 6
,1;"Points:";AT 9,1;"Frames:";AT
 12,1;"Break :";AT 15,1;"Last";A
T 16,3;"shot:"
 14Ø DIM a(l): DIM b(l)
 15Ø FOR q=1 TO l
 16Ø LET a=Ø: LET b=Ø: LET s$="
       ": LET b1=Ø: LET b2=Ø: PRI
NT AT 6,s1;a;"   ";AT 6,s2;b;"  "
;AT 9,s1;c;" ";AT 9,s2;d;" ";AT
12,s1;b1;"   ";AT 12,s2;b2;"   ";A
T 16,s1-(LEN s$/2);s$

 17Ø LET b1=Ø
 18Ø PRINT  INVERSE 1; BRIGHT 1;
AT Ø,26;z: PRINT  INVERSE Ø; BRI
GHT Ø; FLASH 1;AT 3,t;a$; FLASH
Ø;AT 3,v;b$;AT 6,s1;a;"  ";AT 9,
s1;c;" ";AT 12,s1;b1;"  ";AT 16,
s1-(LEN s$/2);s$;"  ": GO SUB 4Ø
Ø
 19Ø IF c$="-" THEN  GO SUB 65Ø:
 LET a=a-VAL v$: LET b1=b1-VAL v
$: GO SUB 8ØØ: GO SUB 45Ø: BEEP
.Ø5,4Ø: GO TO 18Ø
 2ØØ IF c$="f" THEN  GO SUB 6ØØ:
 GO TO 63Ø
 21Ø IF c$="1" THEN  BEEP .1,2Ø:
 LET s$="        ": GO TO 26Ø
 22Ø IF c$="Ø" AND a<>b THEN  GO
 TO 35Ø
 23Ø BEEP .Ø5,4Ø
 24Ø LET a=a+VAL c$: LET b1=b1+V
AL c$: GO SUB 45Ø: IF b1>=hi THE
N  LET hi=b1: LET h$=a$: LET hif
=z
 25Ø GO TO 18Ø

 26Ø LET b2=Ø
 27Ø PRINT  FLASH 1;AT 3,v;b$; F
LASH Ø;AT 3,t;a$;AT 6,s2;b;"  ";
AT 9,s2;d;" ";AT 12,s2;b2;"  ";A
T 16,s2-(LEN s$/2);s$;"  ": GO S
UB 4ØØ
 28Ø IF c$="-" THEN  GO SUB 65Ø:
 LET b=b-VAL v$: LET b2=b2-VAL v
$: GO SUB 83Ø: GO SUB 45Ø: BEEP
.Ø5,4Ø: GO TO 27Ø
 29Ø IF c$="f" THEN  GO SUB 6ØØ:
 GO TO 64Ø
 3ØØ IF c$="1" THEN  BEEP .1,2Ø:
 LET s$="        ": GO TO 17Ø
 31Ø IF c$="Ø" AND b<>a THEN  GO
 TO 35Ø
 32Ø BEEP .Ø5,4Ø
 33Ø LET b=b+VAL c$: LET b2=b2+V
AL c$: GO SUB 45Ø: IF b2>=hi THE
N  LET hi=b2: LET h$=b$: LET hif
=z
 34Ø GO TO 27Ø

 345 REM 35Ø-39Ø
        UPDATE FRAME SCORES &
        HIGHEST BREAK ETC.
        CHECKS FOR WINNER

 35Ø IF a>b THEN  LET c=c+1: LET
 m$=a$
 36Ø IF b>a THEN  LET d=d+1: LET
 m$=b$
 37Ø LET a(q)=a: LET b(q)=b: IF
c>d AND c>INT (l/2) OR d>c AND d
>INT (l/2) THEN  GO TO 67Ø
 38Ø FOR o=1 TO 5: BEEP .1,o: NE
XT o: PRINT AT 16,s1-(LEN s$/2);
"                  ";AT 21,Ø;"

"
 39Ø LET z=z+1: NEXT q

 395 REM SUBROUTINE 4ØØ-44Ø:
        4ØØ&41Ø SCAN KEYBOARD
        43Ø CRASHPROOFING

 4ØØ IF INKEY$<>"" THEN  GO TO 4
ØØ
 41Ø IF INKEY$="" THEN  GO TO 41
Ø
```

```
 42Ø LET c$=INKEY$
 43Ø IF c$<>"r" AND c$<>"y" AND
c$<>"g" AND c$<>"n" AND c$<>"e"
AND c$<>"p" AND c$<>"k" AND c$<>
"f" AND c$<>"-" AND c$<>"1" AND
c$<>"Ø" THEN  BEEP .3,-1Ø: GO TO
 4ØØ
 44Ø RETURN

 445 REM SUBROUTINE 45Ø-59Ø
         45Ø-53Ø UPDATE S$
         54Ø-58Ø UPDATE LEAD
                  LINE

 45Ø IF c$="f" THEN  LET s$=" fo
ul"
 46Ø IF c$="-" THEN  LET s$=" er
ror"
 47Ø IF c$="r" THEN  LET s$=" re
d"
 48Ø IF c$="y" THEN  LET s$=" ye
llow"
 49Ø IF c$="g" THEN  LET s$=" gr
een"
 5ØØ IF c$="n" THEN  LET s$=" br
own"
 51Ø IF c$="e" THEN  LET s$=" bl
ue"
 52Ø IF c$="p" THEN  LET s$=" pi
nk"
 53Ø IF c$="k" THEN  LET s$=" bl
ack"
 54Ø LET w$=" points.": LET z$="
 leads by ": PRINT AT 21,Ø;"
                               "
 55Ø IF a-b=1 OR b-a=1 THEN  LET
 w$=" point."
 56Ø IF a>b THEN  LET w=a-b: PRI
NT AT 21,15-LEN (a$+z$+w$)/2;a$;
z$;w;w$
 57Ø IF b>a THEN  LET x=b-a: PRI
NT AT 21,15-LEN (b$+z$+w$)/2;b$;
z$;x;w$
 58Ø IF b=a THEN  PRINT AT 2Ø,Ø;
"
                               "
 59Ø RETURN

 595 REM SUBROUTINE 6ØØ-62Ø
          6ØØ FOUL SHOT
          61Ø ASSIGNS VALUES TO
              CERTAIN FOUL SHOTS

 6ØØ BEEP .Ø5,35: BEEP .Ø5,3Ø: I
NPUT "Please ENTER the fouled ba
ll"'f$: IF f$<>"" AND f$<>"r" AN
D f$<>"y" AND f$<>"g" AND f$<>"n
" AND f$<>"e" AND f$<>"p" AND f$
<>"k" THEN  GO TO 6ØØ
 61Ø IF f$="" OR f$="r" OR f$="y
" OR f$="g" OR f$="n" THEN  LET
f$="4"
 62Ø RETURN

 625 REM 63Ø FOUL AGAINST PR. 2

 63Ø LET b=b+VAL f$: PRINT AT 6,
s2;b;"  ": BEEP .Ø5,4Ø: GO SUB 4
5Ø: GO TO 18Ø

 635 REM 64Ø FOUL AGAINST PR. 1

 64Ø LET a=a+VAL f$: PRINT AT 6,
s1;a;"  ": BEEP .Ø5,4Ø: GO SUB 4
5Ø: GO TO 27Ø

 645 REM SUBROUTINE 65Ø
         SCORE CORRECTION

 65Ø BEEP .Ø5,35: BEEP .Ø5,3Ø: I
NPUT "Please ENTER ball to be de
leted"'v$: IF v$<>"r" AND v$<>"y
" AND v$<>"g" AND v$<>"n" AND v$
<>"e" AND v$<>"p" AND v$<>"k" AN
D v$<>"f" THEN  GO TO 65Ø
 66Ø RETURN

 665 REM 67Ø&68Ø END OF MATCH

 67Ø FOR m=1 TO 3: FOR o=1 TO 35
 STEP 3: BEEP .Ø1,o: BORDER o/6:
 NEXT o: NEXT m: BORDER 4
 68Ø LET a=Ø: LET b=Ø: LET b1=Ø:
 LET b2=Ø: PRINT AT 6,s1;a;"   ";
AT 6,s2;b;"   ";AT 9,s1;c;"   ";AT
9,s2;d;"   ";AT 12,s1;b1;"   ";AT 1
2,s2;b2;"   "; FLASH 1; BRIGHT 1;
AT 16,1Ø;"   MATCH OVER    "; I
NK 1; FLASH Ø; BRIGHT Ø;AT 21,Ø;
"
 "
 69Ø PRINT #1; FLASH 1; BRIGHT 1
;"  Press any key for match info
 ": GO SUB 75Ø: CLS

 695 REM 7ØØ&71Ø MATCH INFO.

 7ØØ PRINT AT Ø,8;"MATCH INFORMA
TION"; INK 7;AT 1,Ø;"
                 "' INK Ø;
m$;" won in frame ";z;"."''"The h
ighest break of the match"'"was
";hi;" which ";h$;" obtained"'"i
n frame ";hif;"."
```

```
 710 PRINT '"Frame:";TAB t;a$;TA
B v;b$' INK 7;"
      ": INK Ø: FOR w=1
 TO z: PRINT TAB 2;w;TAB s1;a(w)
;TAB s2;b(w): NEXT w
 720 PRINT #1; FLASH 1; BRIGHT 1
;"   Press ""Y"" to use again
   ": GO SUB 750
 730 LET z$=INKEY$: IF z$="y" TH
EN  RUN

 735 REM 740 PROGRAM REMOVAL

 740 CLS : PRINT "This program w
ill remove itself"'''"completely
from memory in five"''TAB 12;"se
conds": PAUSE 1Ø: FOR n=1 TO 5:
BEEP .1,3Ø: PAUSE 4Ø: NEXT n: RA
NDOMIZE USR Ø

 745 REM SUBROUTINE 75Ø-77Ø
         75Ø&76Ø SCAN KEYBOARD

 75Ø IF INKEY$<>"" THEN  GO TO 7
5Ø
 76Ø IF INKEY$="" THEN  GO TO 76
Ø
 77Ø RETURN

 775 REM SUBROUTINE 78Ø
         CALCULATES COLUMN OF
         PR. 1'S NAME & SCORE

 78Ø LET s=LEN a$: LET t=14-(s/2
): LET s1=t+(s/2)-1: RETURN

 785 REM SUBROUTINE 79Ø
         CALCULATES COLUMN OF
         PR. 2'S NAME & SCORE

 79Ø LET u=LEN b$: LET v=25-(u/2
): LET s2=v+(u/2)-1: RETURN

 795 REM SUBROUTINE 8ØØ-82Ø
         PREVENTS b1 & a<Ø

 8ØØ IF b1<Ø THEN  LET b1=Ø
 81Ø IF a<Ø THEN  LET a=Ø
 82Ø RETURN

 825 REM SUBROUTINE 83Ø-85Ø
         PREVENTS b2 & b<Ø

 83Ø IF b2<Ø THEN  LET b2=Ø
 84Ø IF b<Ø THEN  LET b=Ø
 85Ø RETURN

 855 REM 86Ø-1Ø4Ø INSTRUCTIONS

 86Ø BORDER Ø: PAPER Ø: INK 6: C
LS : PRINT  BRIGHT 1; INVERSE 1;
AT Ø,6;"INSTRUCTIONS FOR USE"; B
RIGHT Ø; INVERSE Ø;'''"The follo
wing method has been"'"used to e
nter the potted ball."
 87Ø PRINT '"The first letter of
 each ball is"'"pressed on the k
eyboard and the"'"value of that
ball is added to"'"the score of
the player whose"
 88Ø PRINT "name is flashing."''
"e.g. If a red ball is potted,th
e""R"" key is pressed;a green ba
ll;"
 89Ø PRINT "the ""G"" key, and s
o on."''"The exceptions are thos
e balls"
 9ØØ PRINT "whose colours begin
with ""B"".""To enter these bal
ls,the LAST"'"letter is used..."
: GO SUB 1Ø8Ø
 91Ø PRINT "e.g. To enter a brow
n ball,press"'"the ""N"" key; a
blue ball,the ""E""'"key; and f
inally the black,""K""."
 92Ø PRINT '"To change the flash
ing of one"'"name to the other,
press ""1"".""Resetting the poi
nts to Ø at theend of a frame is
  achieved  by pressing the ""Ø"
" key."
 93Ø PRINT '"If a foul shot occu
rs,the guilty"'"player's name sh
ould be set to  flash and the ""
F"" key pressed."
 94Ø PRINT "In response to the p
rompt which"'"will  appear, ENTE
R  the  fouledball. If the cue b
all was pottedthen just  press
""ENTER"".  The"'"appropriate  a
mount will then be"
 95Ø PRINT "added  to  the innoc
ent player's"'"score.": GO SUB 1
Ø8Ø
 96Ø PRINT "The  program  also
offers  the"'"facility of correc
ting a wrong"'"input.  For examp
le, say you pot"'"the green  bal
l and accidentally"'"add the  bl
ack to your score (or"
 97Ø PRINT "give points to the w
rong player)"'"all that you have
```

```
to do is press"'"the minus key(
symbol shift & J)."''"In respons
e to the prompt,ENTER"
 98Ø PRINT """K"" and the value
of the black"'"ball will be dedu
cted from your"'"score,enabling
the green ball tobe ENTERed": GO
 SUB 1Ø8Ø
 99Ø PRINT "It  should  be  reme
mbered  that"'"when  correcting
 a  score, the"'"points will be
deducted from the"'"player whose
 name is flashing,"'"and the  ""
last shot""  will show"'"""error
"" to  remind  you  that  a"'"co
rrection is being made."
1ØØØ PRINT '"To  keep  the  corr
ect  ""break"""'"displayed, it i
s essential that"'"the  player
who  is  shooting"'"should have
his name flashing."'"e.g. If pl
ayer 1 has just scored"'"and pla
yer 2 does not score,the"
1Ø1Ø PRINT "next  pot  by  playe
r 1  will be"'"added to his prev
ious break,and"'"points obtained
 on two visits"'"to the table do
 not count as one"'"break.": GO
SUB 1Ø8Ø
1Ø2Ø PRINT  BRIGHT 1; INVERSE 1;
AT Ø,9;"SUMMARY OF KEYS": INVERS
E Ø: PRINT ''"R = Red"'"Y = Yell
ow"'"G = Green"'"P = Pink"'"N =
browN"'"E = bluE"'"K = blacK"'"F
 = Foul"'"1 = change name flash"
'"Ø = end of frame"
1Ø3Ø PRINT "- = score correction
"''"This program uses the INKEY$
"'"function, so it is not necess
ary"'"to press ""ENTER"", unless
 this is"'"indicated by a prompt
."
1Ø4Ø PRINT  BRIGHT 1; FLASH 1;AT
 2Ø,2;"Press ""Y"" to see instru
ctions";AT 21,2;"again,any other
 key to start."
1Ø5Ø GO SUB 75Ø
1Ø6Ø LET z$=INKEY$: IF z$="y" TH
EN  GO TO 86Ø
1Ø7Ø CLS : GO TO 7Ø
1Ø8Ø PRINT  BRIGHT 1; FLASH 1;AT
 21,2;"Press any key to continue
..."
1Ø9Ø GO SUB 75Ø
11ØØ CLS : RETURN

1105 REM SUBROUTINE 111Ø-127Ø
       111Ø-116Ø SETS UP POCKETS
       117Ø-126Ø DRAWS TABLE

111Ø FOR i=Ø TO 7: READ p1: POKE
 USR "a"+i,p1: NEXT i
112Ø FOR i=Ø TO 7: READ p2: POKE
 USR "b"+i,p2: NEXT i
113Ø FOR i=Ø TO 7: READ p3: POKE
 USR "c"+i,p3: NEXT i
114Ø FOR i=Ø TO 7: READ p4: POKE
 USR "d"+i,p4: NEXT i
115Ø FOR i=Ø TO 7: READ p5: POKE
 USR "e"+i,p5: NEXT i
116Ø FOR i=Ø TO 7: READ p6: POKE
 USR "f"+i,p6: NEXT i
117Ø PRINT  INK Ø;"

                  "
118Ø PRINT  INK Ø;"  "; INK 4;
"                        ";
INK Ø;" "; INK 4;"
            "; INK Ø;"  "
119Ø FOR i=1 TO 16: PRINT  INK Ø
;" "; INK 4;"

        "; INK Ø;" ": NEXT i
12ØØ PRINT  INK Ø;"  "; INK 4;
"                        ";
INK Ø;" "; INK 4;"
            "; INK Ø;"  "
121Ø PRINT  INK Ø;"

                  "
122Ø PLOT  PAPER 7; INK 4; INVER
SE 1;7Ø,24
123Ø DRAW  PAPER 7; INK 4; INVER
SE 1;Ø,143
124Ø PLOT  PAPER 7; INK 4; INVER
SE 1;7Ø,6Ø
125Ø PLOT  PAPER 7; INK 4; INVER
SE 1;7Ø,64: DRAW  PAPER 7; INK 4
; INVERSE 1;Ø,64,-PI*1.Ø3
126Ø PLOT  PAPER 7; INK 4; INVER
SE 1;132,94: PLOT  PAPER 7, INK
4; INVERSE 1;19Ø,94: PLOT  PAPER
 7; INK 4; INVERSE 1;225,94
127Ø RETURN
128Ø DATA 252,252,252,248,24Ø,22
4,Ø,Ø
129Ø DATA 255,255,255,255,126,6Ø
,Ø,Ø
13ØØ DATA 63,63,63,31,15,7,Ø,Ø
131Ø DATA Ø,Ø,224,24Ø,248,252,25
2,252
132Ø DATA Ø,Ø,6Ø,126,255,255,255
,255
133Ø DATA Ø,Ø,7,15,31,63,63,63
```

Bounce Down

Jack Knight goes beyond catching a bullet — catch a Brighton cannon ball!

The idea is crazy. Catch a *cannon-ball*! (but that's not all). What's the cannon-ball doing? Would you believe, it's **bouncing**!

It takes a good eye to high score in this original arcade game written in BASIC. To play, use the cursor keys and to position the catcher to take the ball. But take care, a misjudgement can be fatal, and the bounce of the ball is not regular. If, instead of going through the opening, the ball comes down on the raised-up top, the catcher is destroyed. You have a store of seven catchers, and 50 balls with which to set up a record score.

The main sections of the program are clearly identified by REMs which indicate their functions. But, the following comments may be of interest:

Variables d and a drive the cannon ball across the screen. The bounce is achieved by adding or subtracting dd (and using a double negative to make a positive).

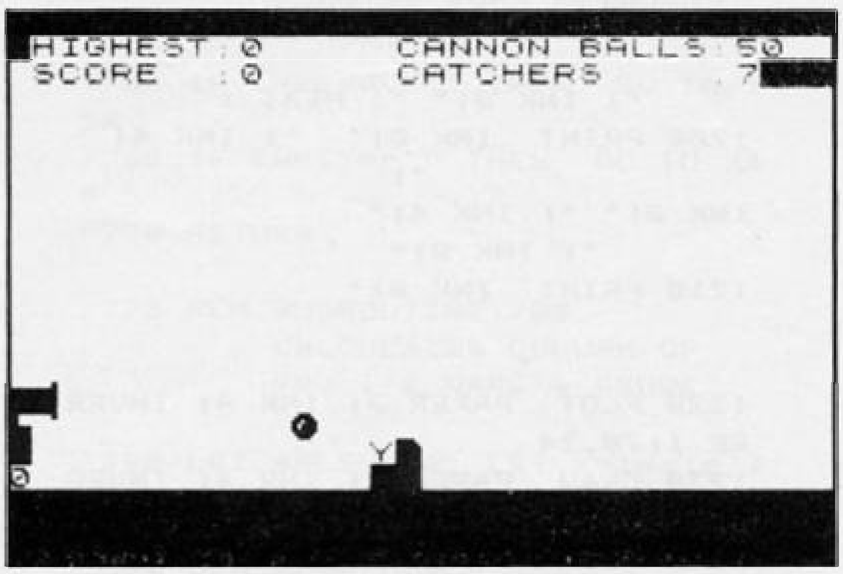
The problem of identifying the blue opening of the catcher from the rest of the sky for the purpose of recording catches was overcome by printing a Y, which is invisible because the INK colour is the same as the sky (and using SCREEN$). ATTRIBUTE is used to identify the catcher and also to ensure the cannon ball eraser does not erase part of the catcher.

To introduce variety, the track of the ball is not only randomised at the mouth of the cannon but is diverted ("uneveness of the ground") en route.

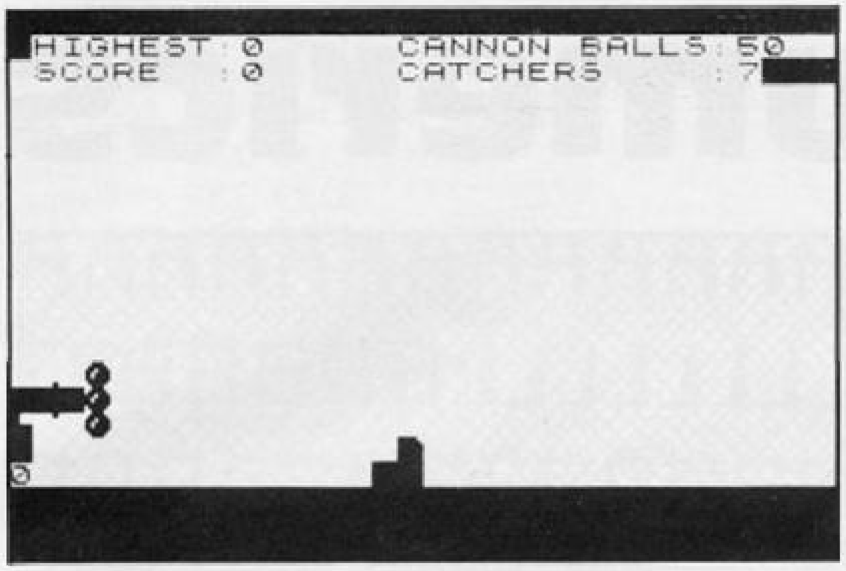
Keyboard graphics have been used in particular to construct the cannon, not mainly because it's simpler, but, as User Defined Graphics can be coarse, the result here would have been no improvement. The exception is the rim of the barrel where the keyboard graphics would have been too heavy. (You need to watch out for these two User Defined Graphics when typing the cannon construction program line). The cannon ball had to be specially designed (complete with shine) but has been made to earn its living by doubling, disguised in white, as the smoke from the cannon.

Variable i has been used as an on/off switch to ensure the ball is caught only when bouncing down and to restrict the destruction of the catcher to a direct hit on the raised up portion.

The design of the program means that New Game does not go through the opening instructions or the setting-up again.



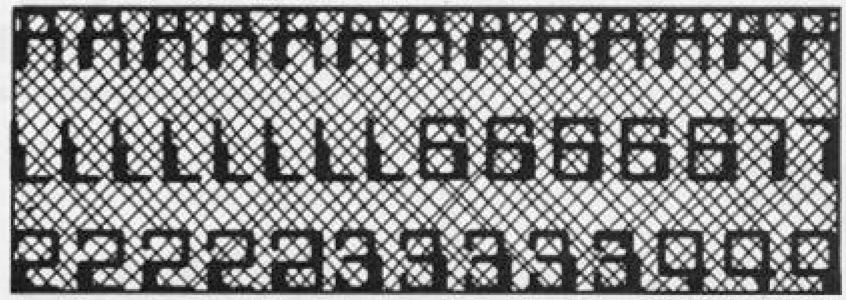

```
   1 REM **********************
         *Underlined characters*
         *are entered in       *
         *GRAPHICS mode.       *
         **********************
  1Ø REM  *BOUNCE DOWN* by Jack
Knight
  2Ø LET h=Ø
  3Ø GO TO 6ØØØ
  9Ø REM *MAIN ROUTINE*(NB"GRAPH
ICS"+D,C)
 1ØØ IF a>31 THEN  GO TO 5ØØ
 1Ø5 PRINT AT d,a;"C"
 11Ø PRINT AT 17,f+1;" ": PRINT
AT 18,f;"  ": IF ATTR (17,f)<>4Ø
 THEN  PRINT AT 17,f;" "
 12Ø LET f=f+(INKEY$="8" AND f<=
29)-(INKEY$="5" AND f>=11)
 13Ø PRINT ; INK 5;AT 17,f;"Y";T
AB f+1; INK 6;"C";AT 18,f; INK 6
; PAPER 3;"■■"
 14Ø IF ATTR (d,a)<>4Ø THEN  PRI
NT AT d,a;" "
 15Ø LET d=d+dd: LET a=a+aa
 16Ø IF d=17 THEN  GO TO 2ØØ
 17Ø IF d=18 THEN  GO TO 3ØØ
 18Ø IF d=14 THEN  GO TO 4ØØ
 19Ø GO TO 1ØØ
 2ØØ REM *DECIDES CATCH/LOST CAT
CHER*(NB"GRAPHICS+D)
 21Ø IF ATTR (d,a)=46 AND i=1 TH
EN  GO TO 3ØØØ
 22Ø IF SCREEN$ (d,a)="Y" AND i=
1 THEN  PRINT AT d,a;"D": BEEP .
1,Ø: PRINT AT d,a;" ": LET s=s+5
: PRINT ; INK 7; PAPER Ø;AT 2,9;
s;AT 1,28;j-1;"  ": LET j=j-1: G
O TO 24ØØ
 23Ø GO TO 1ØØ
 3ØØ IF ATTR (d,a)=3Ø THEN  LET
a=a-1: LET aa=Ø
 31Ø LET dd=-dd
 32Ø IF INT (RND*2+1)=1 THEN  LE
T aa=Ø
 33Ø LET i=Ø
 34Ø GO TO 1ØØ
 4ØØ LET dd=-dd
 41Ø LET aa=1
 42Ø LET i=1
 43Ø GO TO 1ØØ
 5ØØ LET j=j-1: PRINT ; INK 7; P
APER Ø;AT 1,28;j;"  ": IF j=Ø TH
EN  GO TO 4ØØØ
```




```
 51Ø GO TO 24ØØ
 9ØØ REM *OPENING*
 91Ø BORDER Ø: PAPER 5: CLS
 92Ø PRINT ; INK 1;AT 5,7;"IF BA
LL HITS TOP-";AT 7,7;"CATCHER DE
STROYED";AT 12,6;"TO MOVE CATCHE
R USE";AT 14,11;"<- OR ->";AT 16
,6;"(AFTER CANNON FIRES)"
 93Ø FOR a=1 TO 2Ø: BEEP .1,a: B
EEP .1,2Ø-a: NEXT a: CLS
1ØØØ REM *SETS STAGE*(NB "GRAPHI
CS"+A,B,C)
11ØØ FOR a=19 TO 21: FOR b=Ø TO
31: PRINT ; INK 4;AT a,b;"■";: N
EXT b: NEXT a
12ØØ PRINT AT 14,1;"A";TAB Ø;"■■
";TAB Ø;"▙B";TAB Ø;"■";TAB Ø;"Ø"
13ØØ FOR a=Ø TO 2: FOR b=Ø TO 31
: PRINT ; INK Ø;AT a,b;"■";: NEX
T b: NEXT a
14ØØ PRINT ; INK 7; PAPER Ø;AT 1
,1;"HIGHEST:Ø";TAB 15;"CANNON BA
LLS:5Ø";TAB 1;"SCORE   :Ø";TAB 15
;"CATCHERS    :7"
15ØØ PRINT ; INK 6;AT 17,15;"C";
AT 18,14;"■■"
16ØØ FOR a=1 TO 2Ø: BEEP .1,2Ø-a
: BEEP .1,a: NEXT a
2ØØØ REM *INITIALISES VARIABLES
ETC*(NB "GRAPHICS"+D)
21ØØ LET s=Ø
22ØØ LET f=14
23ØØ LET g=7
235Ø LET i=Ø
2375 LET j=5Ø
24ØØ LET c=INT (RND*2+1)
25ØØ LET e=INT (RND*2+1)
26ØØ LET d=14+c
27ØØ LET dd=1
28ØØ LET a=1+e
29ØØ LET aa=1
295Ø PRINT ; INK 7;AT 14,3;"D";A
T 15,2;"■D";AT 16,3;"D": BEEP .3
,-2Ø: PRINT AT 14,3;" ";AT 15,2;
"  ";AT 16,3;" "
2999 GO TO 1ØØ
3ØØØ REM *LOST CATCHER* (NB "GRA
PHICS"+D)
31ØØ PRINT AT d,a;"D"
32ØØ FOR a=1 TO 3: BEEP .2,5: BE
EP .2,-5: NEXT a
33ØØ PRINT AT 17,f;"  ";AT 18,f;
"  "
34ØØ LET g=g-1: PRINT ; INK 7; P
APER Ø;AT 2,28;g;AT 1,28;j-1;"
": LET j=j-1
35ØØ IF g=Ø OR j=Ø THEN  GO TO 4
ØØØ
36ØØ GO TO 24ØØ
4ØØØ REM *CLOSING*
4Ø5Ø FOR b=1 TO 3
41ØØ FOR a=7 TO Ø STEP -1
42ØØ BORDER a
43ØØ BEEP .1,a
44ØØ NEXT a
45ØØ NEXT b
5ØØØ REM *NEW GAME*
51ØØ PRINT ; INK 1;AT 5,9;"FOR N
EW GAME-";AT 7,9;"PRESS ""ENTER"
"";
52ØØ IF INKEY$=CHR$ 13 THEN  GO
TO 54ØØ
53ØØ GO TO 52ØØ
54ØØ IF s>h THEN  LET h=s
545Ø PRINT ; INK 7; PAPER Ø;AT 2
,9;Ø;"    ";AT 1,28;5Ø;AT 2,28;7;
AT 1,9;h
55ØØ PRINT AT 17,f;"  ";AT 18,f;
"  ";AT 5,9;"              ";AT 7
,9;"              "
56ØØ GO TO 2ØØØ
6ØØØ REM *CREATES GRAPHICS*
61ØØ LET z=255
62ØØ FOR a=1 TO 4
63ØØ READ a$
64ØØ FOR b=Ø TO 7
65ØØ READ c: POKE USR a$+b,c
66ØØ NEXT b
67ØØ NEXT a
68ØØ DATA "A",Ø,Ø,Ø,Ø,Ø,Ø,3,3
69ØØ DATA "B",3,3,Ø,Ø,Ø,Ø,Ø,Ø
7ØØØ DATA "C",252,254,z,z,z,z,z,
z
71ØØ DATA "D",6Ø,126,239,223,223
,z,126,6Ø
72ØØ GO TO 9ØØ
```

Alphanumerics

Darren-John Norbury of Andover sent us this 1 or 2 player game to make you think!



Alphanumerics is based upon the television quiz game 'Countdown'. It is designed to test the player's (or players') quick-thinking and agility with letters and numbers.

The game is divided into eight rounds, six of which are letters games, making the rest numbers games. In the letters games the computer will pick nine letters totally at random (following the 'verb or consonant' prompt which is the only say that the player has in this choice of letters) and display them. The idea then, is to make as long a word as possible inside the allocated thirty seconds (very rough timing) from the displayed letters. A scoring prompt occurs at the end of each game. The letters games are games 1,2,3,5,6 and 7.

Games 4 and 8, therefore, are the numbers games. In this case the computer performs the choosing process itself and comes up with a display of 6 randomly picked numbers, five of which have come from the range 1 to 10 and the sixth of which will be either 25, 50, 75 or 100. Following this a target figure will be displayed. The idea of the game is, using the four mathematical operations (addition, subtraction, multiplication and division), to manipulate the top numbers to arrive at the target figure (using each of the top numbers only once, if at all). Once again, a scoring prompt appears at the end of the game.

Alphanumerics can be played by either 1 or 2 people. If you're playing alone then simply enter your score at the end of each round as prompted. Where two people play, however, the scoring is slightly different. In the letters game each of the players compare their respective scores. If there is a difference in scores then the higher scorer claims the points (the points being equal to the number of letters in the player's word) and the lower scorer receives zero. If the number of letters each has achieved is equal then both players get the points according to the value of the words made. In the numbers game each person always scores according to instruction laid down by the computer, regardless of who is nearer (unless, of course, they are more than 15 adrift).

The maximum points available in this game are 80; my personal best is 46, on the one player option. Good luck!

```
   1 REM ALPHANUMERICS
   6 LET S=0
   7 LET A=0
  10 PRINT "          alphanumeri
cs"
  11 PRINT
  12 PRINT "HOW MANY PLAYERS (1
OR 2)?"
  13 INPUT B
  15 FOR I=1 TO B
  17 PRINT "INPUT NAME ";I
  18 IF I=1 THEN INPUT G$
  19 IF I=2 THEN INPUT H$
  20 IF I=1 THEN LET GS=0
  21 IF I=2 THEN LET HS=0
  22 NEXT I
  24 FOR F=1 TO 150
  25 NEXT F
  26 CLS
  30 FOR R=1 TO 8
  40 IF R=4 THEN LET A=2
  41 IF R=5 THEN LET A=0
  42 IF R=8 THEN LET A=2
  44 IF A=2 THEN PRINT "ROUND ";
R;" IS A NUMBERS GAME"
  45 FOR F=1 TO 50
  46 NEXT F
  47 IF A=2 THEN GOTO 800
  50 PRINT "ROUND ";R;" IS A LET
TERS GAME"
  51 FOR F=1 TO 50
  52 NEXT F
 200 DIM V$(5)
 210 LET V$(1)="A"
 211 LET V$(2)="E"
 212 LET V$(3)="I"
 213 LET V$(4)="O"
 214 LET V$(5)="U"
 220 DIM C$(21)
 221 LET C$(1)="B"
 222 LET C$(2)="C"
 223 LET C$(3)="D"
 224 LET C$(4)="F"
 225 LET C$(5)="G"
 226 LET C$(6)="H"
 227 LET C$(7)="J"
 228 LET C$(8)="K"
 229 LET C$(9)="L"
 230 LET C$(10)="M"
 231 LET C$(11)="N"
 232 LET C$(12)="P"
 233 LET C$(13)="Q"
 234 LET C$(14)="R"
 235 LET C$(15)="S"
```

```
 236 LET C$(16)="T"
 237 LET C$(17)="V"
 238 LET C$(18)="W"
 239 LET C$(19)="X"
 240 LET C$(20)="Y"
 241 LET C$(21)="Z"
 250 CLS
 260 PRINT "VOWEL OR CONSONANT?
(V OR C?)"
 265 FOR T=1 TO 9
 270 INPUT B$
 280 IF B$="V" THEN GOTO 300
 290 IF B$="C" THEN GOTO 350
 300 LET D=INT (RND*5)+1
 305 PRINT " ";V$(D);
 310 GOTO 370
 350 LET D=INT (RND*21)+1
 360 PRINT " ";C$(D);
 370 NEXT T
 380 PRINT
 390 PRINT "YOU NOW HAVE 30 SEC.
S IN WHICH"
 400 PRINT "TO MAKE THE LONGEST
WORD YOU "
 410 PRINT "CAN FROM THE ABOVE L
ETTERS"
 420 FOR F=1 TO 100
 425 PRINT
 430 PRINT "START"
 440 FOR F=1 TO 900
 444 NEXT F
 445 PRINT
 460 PRINT "FINISH"
 470 PRINT
 480 PRINT "NOW CHECK THE VALIDI
TY OF YOUR"
 490 PRINT "WORD AND ENTER YOUR
SCORE"
 500 PRINT "10 POINTS FOR USING
9 LETTERS"
 505 PRINT
 509 PRINT "WHAT HAS ";G$;" SCOR
ED?"
 510 INPUT Q
 511 LET GS=GS+Q
 512 IF B=1 THEN GOTO 525
 513 PRINT "WHAT HAS ";H$;" SCOR
ED?"
 514 INPUT V
 515 LET HS=HS+V
 525 PRINT
 530 GOTO 2000
 800 CLS
 810 PRINT "ROUND ";R;" IS A NUM
BERS GAME"
 820 PRINT "HERE ARE YOUR 5 NUMB
ERS"
 830 DIM E$(5,3)
 840 LET E$(1)="25"
 841 LET E$(2)="50"
 842 LET E$(3)="50"
 843 LET E$(4)="100"
 844 LET E$(5)="75"
 870 LET F=INT (RND*5)+1
 880 PRINT
 890 PRINT E$(F);" ";
 920 FOR I=1 TO 5
 930 LET W=INT (RND*10)+1
 940 PRINT W;" ";
 950 NEXT I
 955 PRINT
 956 LET H=0
 960 LET H=INT (RND*1000)+1
1000 PRINT "THE TARGET FIGURE IS
 ";H
1005 PRINT
1010 PRINT "YOU HAVE 30 SECS TO
GET AS NEAR"
1020 PRINT "AS POSSIBLE"
1030 FOR F=1 TO 100
1040 NEXT F
1045 PRINT
1050 PRINT "START"
1055 PRINT
1060 FOR F=1 TO 900
1070 NEXT F
1080 PRINT "STOP"
1090 PRINT "ENTER YOUR SCORE - 1
0 POINTS "
1100 PRINT "FOR SPOT ON, 5 FOR W
ITHIN 15"
1102 PRINT
1104 PRINT "WHAT HAS ";G$;" SCOR
ED?"
1105 INPUT Q
1106 LET GS=GS+Q
1107 IF B=1 THEN GOTO 2000
1108 PRINT "WHAT HAS ";H$;" SCOR
ED?"
1109 INPUT V
1110 LET HS=HS+V
2000 NEXT R
2010 CLS
2012 PRINT "          **********
*"
2013 PRINT "          FINAL SCORE
S"
2014 PRINT "          **********
*"
2016 PRINT G$;" SCORED ";GS
2017 PRINT
2018 PRINT H$;" SCORED ";HS
2019 PRINT
2040 PRINT "MAXIMUM =80"
```



Letter Puzzle

A beautiful presentation of the block puzzle game from Joao Campos of Portugal.

A$ and B$	The two possible solutions.
C$	Set of the 15 letters + space.
D$	Auxiliary set, to load L$ randomly.
G$ and H$	The two "solution impossible" configurations.
I and J	Loop control variables.
K$	INKEY$ hold.
L$	Letter disposition in the board.
M	Original position of the moved letter.
R	Random pointer to C$ and D$.
RCD	Hi-score.
S	Moves counter.
S$	Initial option (0,1 or 2).
V	Empty position in the board.
X and Y	Printing coordinates (column and line).

This program is about 5.7K long.

Figure 1. The main variables.

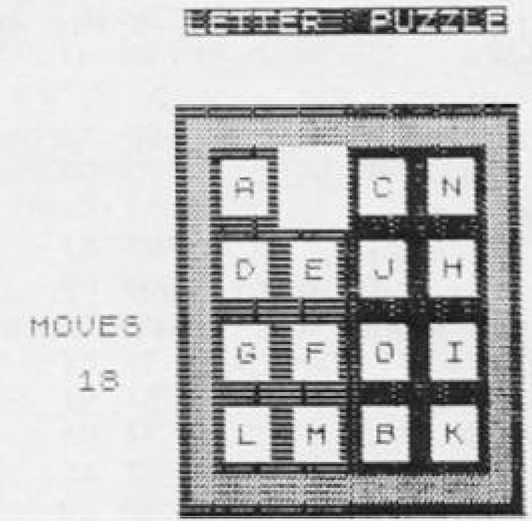
I have used letters in this version rather than the more often used numbers, the main reason being that each square is represented by only one character, and this means it is easier to identify for moving.

Once you have ENTERed and SAVEd the final version and you have RUN the program then, after the title page has been displayed, you have the option of choosing from two solutions of the puzzle. You may choose solution number one, or two, or, by pressing 0, take any of the two (lines 1000-1220). The computer then shuffles the letters (this is done in FAST mode — lines 600-990) and displays the initial disposition of the board (lines 2500-2540).

Now, using the cursor keys, you move the letters around (obviously you can only move each letter horizontally or vertically into the empty square). This is dealt with in lines 100-370. The moves you make are counted, and a hi-score (or rather a low-score) is kept for finding the solution in the least possible moves.

You will find that there are some initial settings that do not allow for a proper solution; that's when the last three letters are M-O-N instead of M-N-O; in this case, either press the "F" key to restart game, or wait for the computer to tell you that the solution is impossible (lines 5000-5010) and invite you to restart (lines 4140-4170).






```
   5 RAND
  10 GOSUB 3000
  20 GOSUB 1000
  30 GOSUB 600
 100 IF INKEY$="" THEN GOTO 100
 120 LET K$=INKEY$
 130 IF K$="F" THEN GOTO 4140
 140 IF K$<"5" OR K$>"8" THEN GO
TO 100
 150 LET M=V+(K$="5")-10*(K$="6"
)+10*(K$="7")-(K$="8")
 160 IF L$(M)=" " THEN GOTO 100
 170 LET L$(V)=L$(M)
 180 LET L$(M)=" "
 190 LET S=S+1
 200 PRINT AT 13,3+(S<100)+(S<10
);S
 210 GOSUB 300
 215 IF L$=G$ OR L$=H$ THEN GOTO
5000
 220 IF L$=A$ OR L$=B$ THEN GOTO
4000
 230 GOTO 100
 300 LET Y=3*INT (V/10)+2
 310 LET X=3*(V-INT (V/10)*10)+7
 320 PRINT AT Y,X;"[graphics]";TAB X;"[graphics]
";L$(V);"[graphics]";TAB X;"[graphics]"
 330 LET Y=3*INT (M/10)+2
 340 LET X=3*(M-INT (M/10)*10)+7
 350 PRINT AT Y,X;"   ";TAB X;"
 ";TAB X;"   "
 360 LET V=M
 370 RETURN
 600 FAST
 610 DIM A$(54)
 620 DIM B$(54)
 630 DIM L$(54)
 640 LET C$="ABCDEFGHIJKLMNO "
 645 LET D$=C$
 650 FOR I=11 TO 14
 660 LET A$(I)=C$(I-10)
 670 LET B$(I)=C$(4*I-43)
 680 GOSUB 900
 690 NEXT I
 700 FOR I=21 TO 24
 710 LET A$(I)=C$(I-16)
 720 LET B$(I)=C$(4*I-82)
 730 GOSUB 900
```

```
740 NEXT I
750 FOR I=31 TO 34
760 LET A$(I)=C$(I-22)
770 LET B$(I)=C$(4*I-121)
780 GOSUB 900
790 NEXT I
800 FOR I=41 TO 44
810 LET A$(I)=C$(I-28)
820 LET B$(I)=C$(4*I-160)
830 GOSUB 900
840 NEXT I
850 GOSUB 2000
860 SLOW
870 RETURN
900 LET R=INT (RND*15)+1
910 IF D$(R)<>"*" THEN GOTO 950
920 LET R=R+1
930 IF R>16 THEN LET R=1
940 GOTO 910
950 LET L$(I)=C$(R)
960 LET D$(R)="*"
970 IF L$(I)=" " THEN LET V=I
980 LET G$=A$
981 LET G$(42)=A$(43)
982 LET G$(43)=A$(42)
983 LET H$=B$
984 LET H$(24)=B$(34)
985 LET H$(34)=B$(24)
990 RETURN
1000 CLS
1020 PRINT TAB 9;"LETTER PUZZLE
"
1030 PRINT AT 2,7;" ▄▄▄▄▄▄ ";TAB 1
9;" ▄▄▄▄▄▄ ";AT 3,7;"▐ABCD▌";TAB 1
9;"▐AEIM▌";TAB 7;"▐EFGH▌<1";TAB
19;"▐BFJN▌";TAB 7;"▐IJKL▌";TAB 1
7;"2>▐CGKO▌";TAB 7;"▐MNO ▌";TAB
19;"▐DHL ▌";TAB 7;" ▀▀▀▀▀▀ ";TAB 1
9;" ▀▀▀▀▀▀ "
1040 PRINT AT 9,2;"CHOOSE YOUR O
PTION:"
1050 PRINT ,,TAB 2;"1 FOR SOLUTI
ON 1;"
1060 PRINT ,,TAB 2;"2 FOR SOLUTI
ON 2;"
1070 PRINT ,,TAB 2;"0 FOR ANY OF
 THE TWO."
1080 IF INKEY$<>"" THEN GOTO 108
0
1090 IF INKEY$="" THEN GOTO 1090
1100 LET S$=INKEY$
1110 IF S$<"0" OR S$>"2" THEN GO
TO 1080
1120 PRINT AT 18,5;"* YOU CHOSE
OPTION ";CHR$ (CODE S$+128);" *"
1130 PRINT AT 20,8;"TO MOVE LETT
ERS,";TAB 8;"USE KEYS 5 6 7 8"
1140 FOR I=1 TO 125
1150 NEXT I
1160 CLS
1170 PRINT AT 8,3;"WHENEVER YOU
WISH TO STOP,",,TAB 11;"PRESS ""
F""",,,,TAB 9;"I AM GOING TO";TA
B 5;"SHUFFLE THE LETTERS..."
1180 FOR I=1 TO 100
1190 NEXT I
1200 LET S=0
1210 CLS
1220 RETURN
2000 PRINT TAB 9;"LETTER PUZZLE
"
2010 PRINT AT 3,8;" ▄▄▄▄▄▄▄▄▄▄▄▄▄▄
▄▄ ";AT 18,8;" ▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀ ";
AT 4,8;"▐▒▒▒▒▒▒▒▒▒▒▒▒▒▒▌";AT 17,
8;"▐▒▒▒▒▒▒▒▒▒▒▒▒▒▒▌"
2020 FOR I=5 TO 16
2030 PRINT AT I,8;"▐▒";TAB 22;"▒
▌"
2040 NEXT I
2050 PRINT AT 11,2;"MOVES";TAB 2
4;"HI-SCORE" AND RCD<>1000
2060 PRINT AT 13,5;S
2065 IF RCD<>1000 THEN PRINT AT
13,26+(RCD<100)+(RCD<10);RCD
2070 FOR I=11 TO 14
2080 GOSUB 2500
2090 NEXT I
2100 FOR I=21 TO 24
2110 GOSUB 2500
2120 NEXT I
2130 FOR I=31 TO 34
2140 GOSUB 2500
2150 NEXT I
2160 FOR I=41 TO 44
2170 GOSUB 2500
2180 NEXT I
2190 RETURN
2500 LET Y=3*INT (I/10)+2
2510 LET X=3*(I-INT (I/10)*10)+7
2530 IF L$(I)<>" " THEN PRINT AT
 Y,X;"▛▀▜";TAB X;"▌";L$(I);"▐";T
AB X;"▙▄▟"
2540 RETURN
3000 LET RCD=1000
3010 PRINT "J.CAMPOS";TAB 27;"19
84"
3020 PRINT
3030 PRINT ,," ..."
3040 PRINT " ..."
3050 PRINT " ..."
3060 PRINT
3070 PRINT ,," ..."
3080 PRINT " ..."
3090 PRINT " ..."
3110 PRINT ,,,,,," PLACE 15 LET
TERS INTO ORDER"
3120 PRINT ,,,,,,TAB 8;"(PRESS A
NY KEY)"
3130 IF INKEY$="" THEN GOTO 3130
3140 RETURN
4000 IF S$="1" AND L$<>A$ OR S$=
"2" AND L$<>B$ THEN GOTO 100
4010 FOR I=1 TO 10
4020 PRINT AT 20,2;"YOU MADE IT,
CONGRATULATIONS."
4030 IF S>=RCD THEN GOTO 4060
4040 PRINT AT 10,25;"A NEW"
4045 PRINT TAB 24;"HI-SCORE"
4050 PRINT AT 13,26+(S<100)+(S<1
0);S
4060 FOR J=1 TO 2
4070 NEXT J
4080 PRINT AT 20,2;"YOU MADE IT.
CONGRATULATIONS."
4090 IF S<RCD THEN PRINT AT 10,2
5;"A NEW"
4100 FOR J=1 TO 2
4110 NEXT J
4120 NEXT I
4130 IF S<RCD THEN LET RCD=S
4140 PRINT AT 21,7;"ANY KEY TO R
ESTART"
4145 IF INKEY$<>"" THEN GOTO 414
5
4150 IF INKEY$="" THEN GOTO 4150
4160 CLS
4170 GOTO 20
5000 PRINT AT 20,6;"IMPOSSIBLE
TO SOLVE"
5010 GOTO 4140
9000 SAVE "PUZZLE"
9010 RUN
```

ZX COMPUTING

Lineage: 40p per word.
Semi display: £9.00 per single column centimetre. Ring for information on series bookings/discounts.

All advertisements in this section must be prepaid.
Advertisements are accepted subject to the terms and conditions printed on the advertisement rate card (available on request).

01 - 437 0699

Send your requirements to:
STUART TAYLOR
ASP Ltd., 1 Golden Square, London W1

UTILITIES

SPECTRUM TAPE AND DRIVE TRANSFER UTILITIES

ALL SPECTRUM owners need TC7 — our specialist tape utility. Send SAE for FULL DETAILS of this amazing and widely used program.
* Integral header reader.
* includes BAUD RATE (speed) measurer.
* can save high speed/jerky parts in "normal" form for DRIVE transfer.
* so many extra features we can't possibly list them here. Just try it and see. As the market leader we can't afford to let you down.

COST only £6.50 (or £9.99 on cartridge with MT6 a special m/drive program — £7.50 with MT6 on tape)

TAPE TO DRIVE TRANSFER OF RECENT PROGRAMS

Yes SPECTRUM owners now have a **LOW COST** way of tranferring many of even the **LATEST** high speed/jerky programs to their drives. You will be amazed! Other methods are expensive or very limited.

Firstly you need our MD1b (for m-drive) or WD16 (for Wafa/or Disc drive. They give you the tools to convert programs so that they will run on your drive. Includes ability to cope with v.long programs, can split/chop bytes in one go, "VAL" creator, REMkill, make Visible, etc. etc. **FULL** manual (highly rated by CRASH) with example transfers. (also need TC7 for latest programs). **MD1b or WD1b cost £6.99** "Manages more programs" — Your Spectrum. (TC7 also needed for latest programs).

LERM INFORMATION SHEETS

Each sheet gives you the DETAILED instructions required to transfer 8 of the more POPULAR programs to drive using our software. They cost **£1 each plus SAE.** Up to sheet 5 available.

TRANSFER PACK — TC7+MT6+MD1b on CARTRIDGE + information sheets 1-3 all for £15.30 (other drive owners get programs on tape + sheets for same price with WD1b replacing MD1b).

UPDATE SERVICE: for latest version on your LERM product send old tape + large SAE to get a £2 REDUCTION. **OVERSEAS:** add £1 Europe, £2 others for each product. **SAE for enquiries**

ALL PROGRAMS CARRY OUR MONEY BACK GUARANTEE (not updates)

LERM, DEPT ZX, 10 BRUNSWICK GDNS, CORBY, NORTHANTS. NN18 9ER.

SOFTWARE

HORSE RACING WINNERS

After a profitable flat season we have introduced an exciting program for the National Hunt — the BRIMARDON JUMP FORMULA.

This is NOT A GAME, but a serious program for anyone interested in making money out of horse racing. However, you don't have to have racing knowledge to use the program — it is user friendly and guides you throughout.

It deals differently with the various types of races and includes past form, speed figures, going, distance winners, class of horses, trainers at different courses, etc, and incorporates much specialised racing knowledge.

This knowledge was put to good use during the flat season when, despite the poor summer and its effect on results, our flat program — the Brimardon Formula — recorded an incredible 39% profit margin. All results are fully checkable.

Our customers were naturally delighted!

"I am most impressed by your efforts to make racing pay" - *Mr. G.T. (Carlisle)*

"Thanks for giving me the edge over the bookies" - *Mr. J.T. (Wigan)*

"Please let me know if you have a National Hunt program as good as the Brimardon Formula" - *Mr S.H. (Hertford)*

"Very many thanks for two wonderful programs which are such fun to use and worth every pound spent on them" - *Mr. T.H. (Hemel Hempstead)*

"I have found your program excellent" - *Mr. C.S. (Woodley)*

"Thank you very much for a 100% service" - *Mr. J.H. (Blackburn)*

"A return of £180" - *Mr. J.G. (Prestwick)*

Full instructions are also sent on how to adapt the program to your own needs and include any ideas of your own if you wish to do so.

PRICE — £20 (this includes full operating instructions and 10 pages of detailed guidelines on how to make racing pay).

Available for BBC(B), SPECTRUM, Commodore, Amstrad.
Send cheque or P.O. for return of post service to
BRIMARDON COMPUTER RACING SERVICE
48, Pierremont Road, Darlington DL3 6DH

Other racing software also available, including the profitable BRIMARDON FORMULA for the flat. Details on request.

INTERFACE 007

The Ultimate device to transfer ANY program, even Hyper Loads to a Microdrive. (Wafa/Disc-drive versions available shortly). Simply load as normal, press a button on Interface 007 and the program freezes. Press a key & a special copy Saved to tape. Reload this by MERGE "" Enter GO TO 2 and program virtually jumps onto cartridge. Cartridges Load independent of Interface.

INTERFACE 007 . £29.95

(plus £1.50 Reg postage)
O/seas: Europe +£2 Others +£4

ZX-GUARANTEED (Dept ZX)
29 Chadderton Drive, Unsworth, Bury, Lancs. Tel: 061-766 5712

VIDEO

XXX VIDEO

Telephone (day or night)
0373 - 830563
FOR DETAILS

Glossy list from: **XXX Video Club, 2 Streatham High Rd., London SW16**
(You must be over 18 to ask for details)

FOR SALE

SINCLAIR 16K rampacks for ZX81, £6, including VAT & postage. Halbar, Unit 1, Bury Walk, Bedford, Beds.

PUNTERS PARTNER

Written by a mathematician, formerly permutation adviser for a leading pools firm.
FOOTBALL: "Of all forecasting methods I have seen I consider yours the most brillian", Mr E.D of Somerset (copy to this magazine)
By analysing recent results an ACCURATE rating is computed for each team (about 65 for lowly Div 4 or Scots 2 to 100 for a top class club). TRUE ODDS for any match between these teams are displayed.
HOMES, AWAYS, DRAWS shown in order of merit
TREBLE CHANCE matches selected in the same pattern as score draws occur on the coupon
UNIQUE accumulative odds calculator for individual (fixed) odds betting
RACING: Popular bets explained. Comprehensive calculator gives returns from almost any bet
EASY TO USE full instructions given throughout. Past results & team names are in the program. Updating couldn't be easier
ONLY **£8.95** (overseas please add £1 p&p)
BOXOFT (Dept Z)65 ALLANS MEADOW, NESTON, SOUTH WIRRAL L64 9SQ
Tel: 051-336 2668
Available for 48K Spectrum only

FREE SPECTRUM software loan when you join our library. Games educational/utilities available. Full details from 'Cygnet Software', 412 Fulbridge Road, Werrington, Peterborough, Cambs. PE4 6SE.

SENSATIONAL postal software bargains for Amstrad, Atari, BBC, Commodore (all formats), Electron, Spectrum. For free list send a SAE or phone Teletex Cleckheaton 0274 875299. 28 Brooklyn Court, Bradford Road, Cleckheaton, W. Yorks.

ALARMS

BURGLAR ALARM Equipment. Please visit our 2,000 sq. ft. showrooms or write or phone for your free catalogue. CWAS Ltd., 100 Rooley Avenue, Bradford BD6 1DB. Telephone: (0274) 731532.

TO ADVERTISE YOUR REPAIRS AND SPARES SERVICE PHONE STUART TAYLOR 01-437 0699

COMPUTER REPAIRS

We are the experts, having serviced Sinclair computers since the introduction of the ZX80.

Don't waste money on estimates – we repair Sinclair computers at price quoted (inclusive parts, labour, postage, VAT, irrespective of fault. No hidden charges.

Repairs guaranteed for 3 months.

Spectrum	£18.75 inc parts
ZX81	£11.50 inc parts
16 KRam	£9.95 inc parts
Microdrive	£15.95 inc parts
Interface 1-11	£18.75 inc parts
also	
BBC	£22.00 + parts
Electron	£19.95 + parts
XK Memory Expansion Kit	£15.95

Computer Retailers please phone for Special Trade Price.

Call or send with cheque or P.O.

T.V. Services of Cambridge Ltd.
French's Road, Cambridge, CB4 3NP
Tel. 0223 311371

SPECTRUM REPAIRS

We expertly repair Spectrums for £17 inclusive of parts and labour and return postage.

Spectrums upgraded to 48K for £34 inc. P&P. All keyboard faults cost only £12.

R. A. Electronics,
133 London Road South,
Lowestoft, Suffolk.
Tel: (0502) 66289.

ZX SPECTRUM REPAIRS

CHECK THESE FACTS
1. FAST RELIABLE SERVICE
2. QUALIFIED STAFF
3. 3 MONTH GUARANTEE
+ + FREE POSTER + +

Send your machine only
Plus a cheque/PO for £19.95

To: MICROTRIX
24 Gt. Moor St. Bolton BL1 1NP
Tel. 0204 398176

SINCLAIR COMPUTER REPAIRS

All machines despatched within 72 hours of receipt.
Spectrum **£17.00** ZX-81 **£12.50**
Spectrum 16 to 48K upgrade **£25.00**
(inc. parts, VAT and return postage)
For a fast and reliable service, send mahcine, brief description of fault and cheque or postal order to the experts:

Capital Computer Services,
Sinclair Dept., 44 Rich's Road,
Cardiff CF4 4AA.
Tel: (0222) 614401.

BBC SPECTRUM REPAIRS

- Spectrum repairs £18.95 inc. parts, insurance and p.p.
- BBC B repairs £18.95 + parts, insurance and p + p.

Send your computer with cheque or P.O. for £18.95 and description of fault to:

SUREDATA (ZX).
Computer Service
45 Wychwood Avenue, Edgware, Middx. Tel: 01-951 0124 PL53

SINCLAIR SERVICE CENTRE

Fast repair service for Spectrum, ZX81, Interface 1 and microdrive. All units repaired to original standard by our HNC qualified staff. Average repair cost £15 but for free estimate send your machine with £1.95 (return postage) with a brief description of fault. Turn-around approx. 24hrs. Established International Service. Our work is fully guaranteed. Personal callers welcome.

QUANTUM
33 City Arcade, Coventry CV1 3HX
or phone (0203) 24632 or (0203) 714080

FREEPOST SPECTRUM REPAIRS

Guaranteed Six Months

We have been maintaining all types of computer systems from mainframes to micros for over 15 years and offer you:

- Full overhaul and update with each repair
- Six months warranty on *whole* computer – not only the repair done
- 24hr turnaround on most faults – including soak test
- Returned to you by first class post fully insured
- Freepost – we pay the postage both ways
- All inclusive price for any fault **£20**

MP ELECTRONICS (ZX), FREEPOST,
DEREHAM, NORFOLK NR19 2BR
Tel: 036287 327

GIVE YOUR BUSINESS A BOOST CALL STUART TAYLOR ON 01-437 0626

SINCLAIR REPAIRS

New low fixed prices: Just look at these —

Spectrum/Plus	£15.00
Microdrive	£18.00
Interface I	£18.00
Interface 2	£12.00
ZX Printer	£12.00

Special winter offer 16-48K only £24.00.

Please enclose brief description of fault and £1.80 p&p for each item sent to:-

Micro-Mend, Main St, Farcet,
Peterborough PE7 3DB
Tel: (0733) 241718.

SPECTRUM REPAIRS

£14.95 inclusive of labour parts and **p&p**. Fast, reliable service by qualified engs., average repair **24hrs. 3 months guarantee**. For help or advice ring:

H. S. Computer Services, Unit 2, The Orchard, Warton, Preston, Lancashire PR4 1BE. Tel: (0772) 632686.

ACCESSORIES

SPECTRUM RGB OUTPUT MODULE
adapt electronics

- Connect a monitor to your Spectrum
- Super sharp text. Superb colour graphics •
- True TTL/Analogue outputs + comp syncs
- Monitor quality pictures – no dot crawl
- Suits RGB monitors & monitor/TVs
- Simply plugs into expansion port
- No separate power supply required
- New through port version. Allows connection of modems, joy-stick interfaces, etc.

Price £34.95 or £36.95 (through port) • £1 p&p many addons part & software SAE for details

20 Starling Close, Buckhurst Hill, Essex IG9 5TN
Tel. 01-504 2840

ELECTRONICS

ELECTRONICS TAPE FOR 48K, ZX SPECTRUM

For small businesses and hobbyists. Input specification for full details of any electronic circuit. Send **£18.00** for quick reply to

N.J. EDWARDS,
68, Woodhill Rise, Costessey, Norwich
Norfolk NR5 0DW

WANTED

CAN YOU program in 280 m/c? Then call me now on 01 405 0978 (Pat) anytime.

WARNING NOTICE

Advertisements placed in this magazine are to be in strict compliance with our standard conditions (copies of which conditions are available on request) and on the clear understanding that the advertiser warrants that his advertisement(s) does not infringe any copyright or condition of sale of any interested party in the advertised product.

Further, the advertiser indemnifies the proprietors of this magazine in respect of costs, damages, or any other claims brought against them as a result of legal action arising from the publication of the advertisement.

Any breach of these terms or the said conditions may result in prosecution of the advertiser by the proprietors.

FOR HIRE

Hire & Exchange Software.
Exchange your software! Phone or send list of your software and ask for details. Software hire! No membership charge. P&P free. Hire tapes from £1.50. Phone for details.
T & P Software, 4 Maine Road, Newland, Drax, Selby, North Yorks. Tel: 0757 618007.

IK/16K ZX81 high quality software! Also A.Z.U.C. exclusive ZX81 world wide club. For details send an SAE to: A.C.V., 1 Foxwell Square, Southfields, Northampton NN3 5AT, England.

NEW!!! All-in-one software club exclusively for spectrum owners – 200+ titles for hire (£1.00 for two weeks). Discounts on current best sellers (up to 70%), free reviews. Write for details: KD Software, 24 Lindsey St., Epping, Essex CM16 6RD.

TERMS & CONDITIONS

CLASSIFIED ADVERTISING TERMS & CONDITIONS

Our terms for new advertisers (semi-display and lineage) are strictly pro-forma payments until satisfactory reference can be taken up (excluding recognised advertising agencies). Cheques and PO's should be crossed and made payable to: ARGUS SPECIALIST PUBICATIONS LTD., and send together with the advertisement to: THE CLASSIFIED DEPT., L/H, NO: 1 GOLDEN SQUARE, LONDON, W1R 3AB.
There are no reimbursements for cancellations. Advertisements arriving too late for a particlular issue will be inserted in the folowing issue unless accompanied by instructions to the contrary.
All advertising sales are subject to Government regulations concerning VAT. Advertisers are responsible for complying with the various legal requirements in force eg: The Trade Description Act, Sex Discrimination Act & The Business Advertisements (Disclosure) Order 1977.
FULL TERMS & CONDITIONS OF ADVERTISING AVAILABLE ON REQUEST.

TO FILL THIS SPACE RING STUART TAYLOR



ACCESSORIES

THE LEADER

ZX-GUARANTEED has established itself as the leading supplier of GENUINELY easy to use tape utility programs for handling ALL types of programs, even the Hyper jerky tone types. We also supply tapes to transfer your progs to Microdrive, etc. Send stamp for full list.

ZX-GUARANTEED (Dept ZX)
29 Chadderton Drive, Unsworth, Bury, Lancs. Tel: 061-766 5712

GAMES



ZX COMPUTING
CLASSIFIED ADVERTISEMENT — ORDER FORM

If you have something to sell now's your chance! Don't turn the page — turn to us!

Rates of charge: 40p per word per issue plus 15% VAT (minimum of 15 words). Please state classification and post to: **ZX COMPUTING, CLASSIFIED DEPARTMENT, 1 GOLDEN SQUARE, LONDON W1.**

					£5.25
					£7.00
					£8.75
					£10.50
					£12.25
					£14.00
					£15.75
					£17.50

Please place my advert in **ZX COMPUTING** for ...... issues commencing as soon as possible.

I am enclosing my Cheque/Postal Order/International Money Order for (delete as necessary) £...... (Made payable to A.S.P. Ltd)

OR Debit my Access/Barclaycard (Delete as necessary)

VISA

We welcome Access

All classified advertisements must be paid for in advance.

Please use BLOCK CAPITALS and include post codes.

Name (Mr/Mrs/Miss/Ms) ....
(delete accordingly)
Address ....
....
....
Signature .... **Date** ....
Daytime Tel. No. ....

The Magic of ARTWORX



THIS IS MORE THAN JUST MANIPULATION OF USER DEFINED GRAPHICS. You will find your own style developing as you become acquainted with the features of this stunning graphics package.

The first time we saw ARTWORX we ended up staying at the office till two in the morning! The more you work with this program, the more you find you can do with it.

When first loaded a comprehensive menu appears, broken down into sections such as FREE, LINE, CIRCLE, POSITION, ERASE and MODIFY. Within these are degrees of variation accessed by moving the joystick controlled cursor to the option of your choice and hitting the fire button.

The screen changes to "canvas" and your cursor becomes a tiny paintbrush activated and deactivated by pressing the fire button.

The speed at which the cursor moves and the thickness of the lines you draw are controlled by a 1-4 keyboard selection.

To change options, tap the space bar and you shoot back to the menu to reselect.

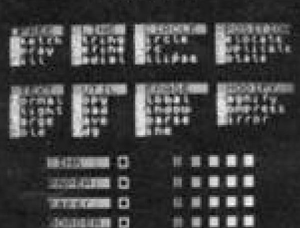
You can create in modules on screen and then move them around, reverse them, mirror them, expand or compress them, erase in part or in total, colour them using "spray", "shade", background and paper selections.

Then combine the modules into a cohesive package and label using any of four typeface variations or select the User Defined Graphics option and design your own typefaces! Save it or dump it to the printer, or, use Tasman's TasCopy to shade in grey scales to the printer.

Also included is ARTWORX GALLERY- You can store up to five designs and recall, review at random or cycle your masterpiece to create animation! This is one of those programs that once you see it run you've got to have one of your own.

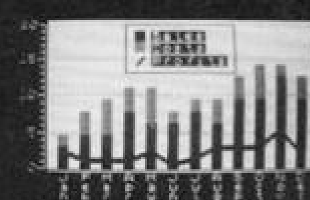
ARTWORX is microdrive compatible, Kempston joystick compatible and will work with Tasman's Printer Interface, (or any printer interface that uses printer buffer software). Create some magic of your own- ARTWORX. **£9.95** Includes VAT

Menu









Question: What new Spectrum game program creates a whole new category of entertainment software, is neither arcade, nor adventure based, and yet combines the thrill of competition with a tough test of your general knowledge? .... time's up!!

Answer: TRIVIA 2000 - A detailed and fast paced version of the popular board game!

• Decide the number of players. • Determine how many questions each player is asked. • Fire up the questions and see how well you can do.

The computer "taunts" you, applauds your success and sympathizes when you are wrong. The scoreboard keeps track of each player's progress and can be checked at any time - the number of questions asked to date, the percentage of the total answered correctly, all with as few disparaging remarks as possible, (this program turns your Spectrum into an arrogant machine!).

Trivia 2000 comes with a set of General Trivia Questions. You can order more questions separately covering: Sports, Colour Code, Super Sleuth and General Categories 1 and 2. Watch subsequent adverts for new category listings.

This is a great game individually or collectively and also a great way for non-computer users to experience the versatile attributes of the Spectrum, (it's also a lot of fun!!). **£ 9.95** Includes VAT

"FRAME" and "TRUSS"

At last, we have "FRAME" and "TRUSS" programs that will put the Spectrum Plus to work for the Consulting Design Engineer, the Civil/Structural and Mechanical Engineer as well as the Engineering student. Please write for information and pricing.

☐ ARTWORX ________ at 9.95
☐ TRIVIA 2000 ________ at 9.95
Please add 50p for shipping & handling
☐ Please send information on "FRAME" and "TRUSS"

Name ____________________

Address ____________________

____

____________________ Postcode ____________

Ramex™ International Ltd.

17620 26 MILE ROAD
WASHINGTON, MICHIGAN 48094 U.S.A.
TELE: 01-313-781-5800


SABOTEUR!
DURELL
software getting harder
SPECTRUM
&
AMSTRAD
R.R.P. £8.95
DURELL sales dept.,
Castle Lodge, Castle Green, Taunton TA1 4AB
Write now for details of Durell's
Great New Competition also
T-shirts, Catalogue
and Posters